Internal Use Only

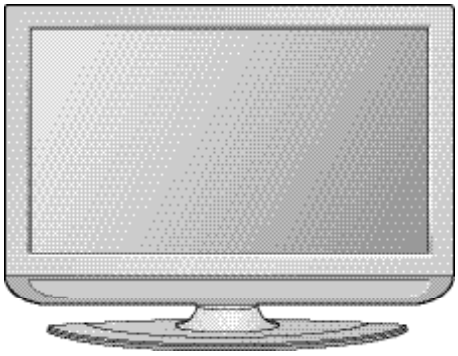
North/Latin America http://aic.lgservice.com
Europe/Africa http://eic.lgservice.com
Asia/Oceania http://biz.lgservice.com

LCD TV
SERVICE MANUAL

CHASSIS : LA75C

MODEL : 37LC6D 37LC6D-UM
37LG10 37LG10-UM

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



Product Service Manual – ZEN37US

Content Index

1. PRODUCT OVERVIEW AND SPECIFICATIONS 2
2 MECHANICAL FUNCTION 9
3 FW DOWNLOAD METHOD 22
4 INTRODUCTION OF D/L JIG FOR SUB-MICRON 23
5 TROUBLE SHOOTING 33
6 ALIGNMENT 38
7 CIRCUIT DIAGRAM 47
8 EDID WRITE 66
9 SYSTEM BLOCK DIAGRAM 69
10 APPEARANCE INSPECTION 71

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

1. PRODUCT OVERVIEW AND SPECIFICATIONS

1.1 SPECIFICATION

PRODUCT SPECIFICATIONS

MODELS		Z32LC6D (Z32LC6D-UM)	Z37LC6D (Z37LC6D-UM)
Dimensions (Width x Height x Depth)	Including stand	31.7 x 23.5 x 10.7 inches 806.4 x 598.9 x 273.9 mm	36.7 x 26.6 x 11.2 inches 934.3 x 675.9 x 285.6 mm
	Excluding stand	31.7 x 21.3 x 3.1 inches 806.4 x 542.4 x 79.0 mm	36.7 x 24.7 x 3.4 inches 934.3 x 628.5 x 88.5 mm
Weight	Including stand Excluding stand	29.9 pounds / 13.3 kg 26.0 pounds / 11.5 kg	41.8 pounds / 19.0 kg 37.0 pounds / 16.8 kg
Power requirement Television System Program Coverage External Antenna Impedance		AC100-240V ~ 50/60Hz NTSC-M, ATSC, 64 & 256 QAM VHF 2-13, UHF 14-69, CATV 1-135, DTV 2-69, CADTV 1-135 75 ohm	
Environment condition	Operating Temperature Operating Humidity	32 ~ 104°F (0 ~ 40°C) Less than 80%	
	Storage Temperature Storage Humidity	-4 ~ 140°F (-20 ~ 60°C) Less than 85%	

■ The specifications shown above may be changed without prior notice for quality improvement.

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

1.2 Panel Specifications

1. Scope:

The incoming inspection standards shall be applied to TFT-LCD Modules (hereinafter called "Modules") that supplied by AU Optronics Corporation (hereinafter called "seller").

2. Incoming inspection right:

The buyer (customer) shall inspect the modules within twenty calendar days sincethe delivery date (the "inspection period") at its own cost. The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller.
The buyer may, under commercially reasonable rejection procedures, reject an entire lot in the delivery involved. Within the inspection period, if the samples of modules within a lot show a number of unacceptable defects in accordance with this incoming inspection standards, the buyer must notify the seller in writing of any such rejection promptly, and not later than within three business days of the end of the inspection period.
Should the buyer fail to notify the seller within the inspection period, the buyer's right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

3. Inspection sampling method:

Unless agreed in writing, the method of incoming inspection shall be based on MIL-STD-105E.

3-1 Sampling type: Normal inspection, single sampling.
3-2 Sampling level: Level II.
3-3 Acceptable quality level (AQL):
Major defect: AQL=0.65%.
Minor defect: AQL=1.0%.

4. Inspection instruments:

4-1 Pattern generator: model LD-2000 or equivalent.
4-2 Video board : AU video board or equivalent. The output of the signal should comply with the specifications provided by AU.

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

5. Inspection Method:

5-1 Ambient condition
A. Temperature: 20 ~ 25℃
B. Humidity: 65±5% RH.
C. Lumination: A single 20W fluorescent lamp (300 to 700 Lux)
5-2 Viewing distance
Be at a distance about 100±5 cm in front of LCD module with naked eyes.
5-3 Viewing Angle
Viewing line should be perpendicular to the surface of the module.

6. Classification of defects:

Defects are classified as major defects and minor defects according to the defect classification defined herein.

6-1 Major defects:
A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.
6-2 Minor defects:
A minor defect is either a defect that is not likely to reduce materially the usability of the product for its intended purpose, or a stray from an intended purpose with little bearing on the effective usage
Specific criteria of judgment on major and minor defects shall be in accordance with "the Classification of Defect " table below.

Defect items	Criterion for defects	Severity
Line Defect	Not allowed any vertical, horizontal and cross line	Major
Foreign Material	Shall be in accordance with the item 7.3 "Foreign Material" in this standard	Minor
Polarizer Defect	Shall be in accordance with the item 7.2 "Polarizer Defect" in this standard	Minor
Dot Defect	Shall be in accordance with the item 7.2 "Dot Defect" in this standard	Minor
Mura	Shall be in accordance with the item 7.5 "Mura" in this standard	Minor

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

7. Inspection Criteria

■ Electrical Inspection

7.1 Dot Defect

A. Every dot herein means a Sub-Pixel (each Red, Green or Blue color).

B. Bright Dot defect is defined as that the defective area of the dot is larger than 50% of the dot area and should be visible under 2% ND filter.

7.1-1 Bright Dot

Bright Dot is defined as Dot (sub-pixel), which appears bright on the screen when the LCD module displayed at dark pattern.

Inspection Item	Criteria
R.G or B 1 dot	0

A partial bright dot damaged less than half size of sub-pixel is not counted as a bright dot defect and should be specified below.

Inspection Item	Criteria
5% ND filter Not-visible	Ignored
5% ND filter Visible 2% ND filter Not-visible	Max. 5 allowed
2% ND filter Visible	Max. 2 allowed

7.1-2 Dark Dot

Dark Dot is defined as Dot (sub-pixel), which appears dark on the screen when the LCD Module displays at bright pattern.

Inspection Item	Criteria
R.G or B 1 dot	Max.7 allowed
Adjacent 2 dots (horizontal and vertical)	2 pairs
Minimum distance between dark dots	≧ 5mm

7.1-3

Total amount of Dot Defects	Max 7 allowed

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

Appearance Inspection

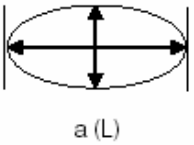
7.2 Polarizer Defects

A. Extraneous substances that can be wiped out such as Finger Prints, particles are not considered defects.

B. Defects on the Black Matrix (outside the Active Area) are not considered defects.

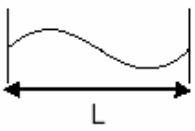
Inspection Items	Criteria
Linear Scratch	0.15≦W≦0.3, L≦30, N≦5
Bubble/Dent	0.5<D≦1.0, N≦10

Where, W (mm): Width
L (mm): Length
D (mm): Average diameter



D =

Note) Linear: a > 2b, Circular: a ≦ 2b

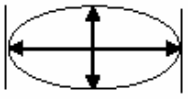


L = Longest point

7.3 Foreign Material

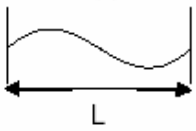
Inspection Items	Criteria
Linear	0.15<W≦0.3, L≦30, N≦5
Circular	0.5<D≦1.0, N≦10

Where, W (mm): Width
L (mm): Length
D (mm): Average diameter



D =

Note) Linear: a > 2b, Circular: a ≦ 2b



L = Longest point

7.4 Bezel Appearance

Scratches, minor bents, stains, particles on the Bezel frame are not considered defects.

7.5 Mura

Item	Criteria
White Spot / Black Spot	Mura should be invisible while2% ND filter apply

All other kinds of Mura should be invisible while 2% ND filter applied, if still any argument, we can set up the limit sample to define it.

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

8. Inspection judgment:

8.1 If the number of defects is more than the applicable acceptance level, the lot shall be rejected and the buyer should inform the seller of the result of incoming inspection in writing.
8.2 Issues which is not defined in this criteria shall be discussed by both parties, Customer and Supplier, for better solutions.

9. Precaution:

Please pay attention to the following items when you use the LCD Module.
9.1 Do not twist or bend the module and also avoid any inappropriate external force on display surface during assembly.
9.2 Adopt good ventilation measures. Be sure to use the module within the specified temperature range.
9.3 Avoid dust or oil mist during assembly.
9.4 Follow the correct power sequence while operating. Do not apply the invalid signal otherwise it will cause unexpected shutdown that damages the module.
9.5 The response time & brightness might vary at different temperature.
9.6 Avoid displaying at certain pattern (e.g. the white pattern) for a long time otherwise it might cause image sticking.
9.7 Be sure to turn off the power while connecting or disconnecting the circuit.
9.8 Display surface Polarizer scratches easily, please avoid dirt or stains on it and handle with care.
9.9 A dewdrop may cause malfunction or worse situation. Wipe off any before using the LCD module.
9.10 Sudden temperature change might cause condensation of materials and possible polarizer damage.
9.11 High temperature and high humidity might undermine the performance. Do not expose the module to the direct sunlight and so on.
9.12 Avoid any acetic acid or chlorine compounds, which are harmful to the LCD module.
9.13 Static electricity might damage the LCD module. Avoid direct touch of the module without any grounded device connected.
9.14 Do not disassemble and reassemble the module by yourself.
9.15 Do not touch the rear of the LCD module directly to avoid possible electric shock by the high voltage of backlight. Make sure the power is off before proceeding.
9.16 Avoid any strong vibration or shock, which might cause a broken LCD module.

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

9.17 Store the modules in cool and dry environment with regular packing.
9.18 Be careful of possible injury caused by a broken module. Also avoid the pressure added onto the (front or rear) surface of modules, which might cause non-uniformity or other function issue to display.

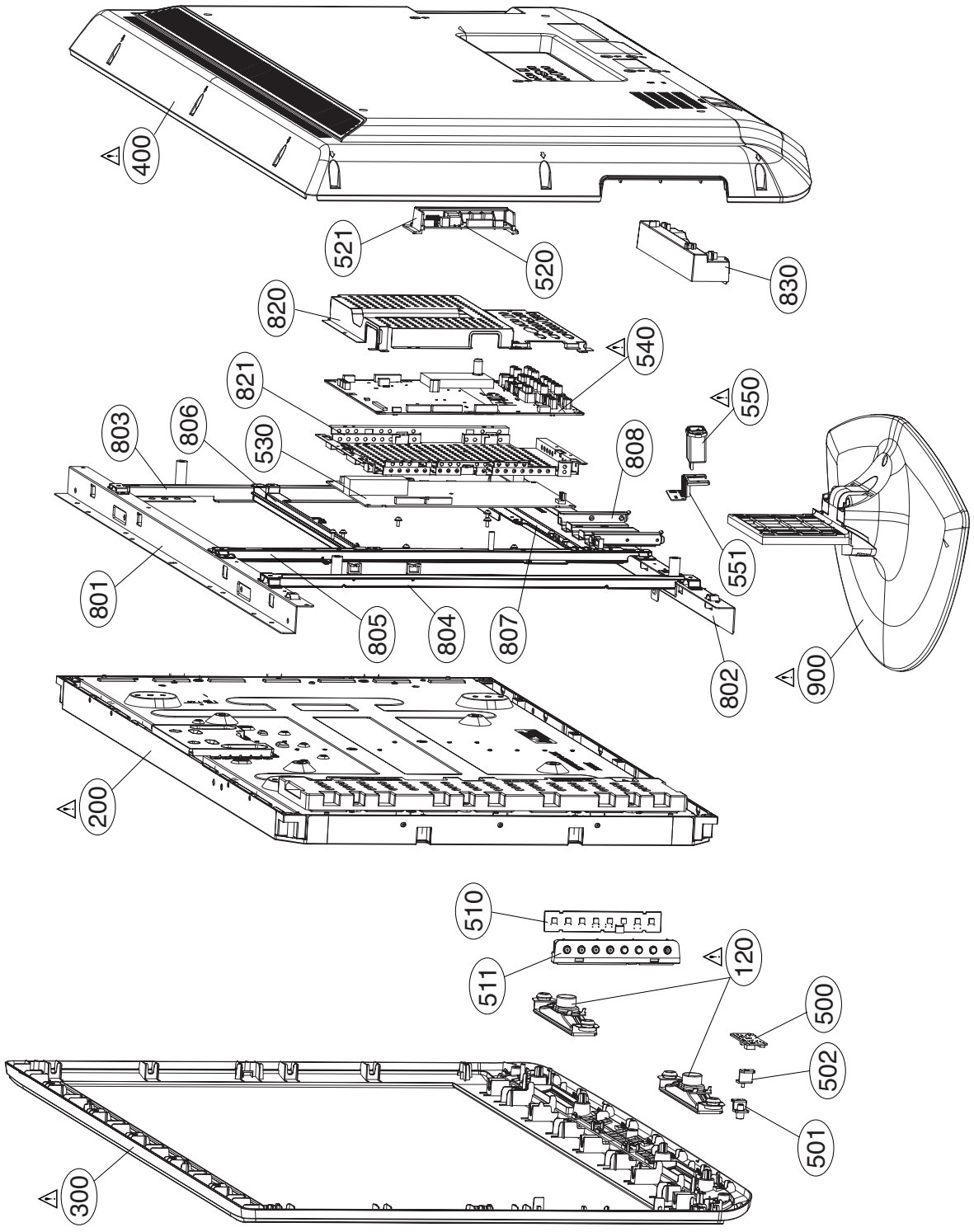
Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

EXPLODED VIEW PARTS LIST

Loc. No.		PART NO.	QISDA PART NO.	DESCRIPTION
⚠	120	COV30059901	2C.40GK0.001	OEM Qisda 2C.40GK0.001 SPEAKER Z37LC6D-UM
	200	COV30057201	5F.MUMV0.031	OEM Qisda AUO MODULE T370XW02-VC Z37LC6D-UM
⚠	300	ABJ56904904	6K.0GL02.041	Cabinet Assembly 37LC6D LA75C 37” Qisda OS LG LOGO
⚠	400	ACQ56905403	6K.0GL03.012	Cover Assembly,Rear Z37LC6D LA75C 37” Qisda V0, B/C ASSY
	500	EBR57525401	5E.0GK03.001	PCB Assembly,Sub SUB T.T IR ASSY Z32LC6D-UM QISDA ODM
	501	MES49416701	4B.0GK01.001	Indicator MOLD PMMA PRE AMP Z32LC6D
	502	MES49417001	4B.0GK02.001	Indicator MOLD PMMA POWER Z32LC6 POWER INDICATOR
	510	EBR57525601	5E.0GL02.001	PCB Assembly,Sub SUB T.T KEY ASSY Z37LC6D-UM QISDA ODM
	511	ABA56902102	6K.0GK05.011	Bracket Assembly CONTROL Z32LC6D LA75C CONTROL BUTTON ASSY
	520	EBR57525201	5E.0GK38.001	PCB Assembly,Sub SUB T.T SIDE A/V QISDA ODM ALL
	521	ABA56905501	6K.0GL06.001	Bracket Assembly SIDE AV Z37LC6D LA75C SIDE AV ASSY, Z37LC6D
⚠	530	COV30057301	5D.0GK07.011	OEM Qisda PSU Z37LC6D-UM
⚠	540	EBU57524901	5E.0GL01.001	Main Total Assembly Z37LC6D-UM ZENITH Qisda ODM MAIN ASSY
⚠	550	COV30059701	5K.0GL09.011	OEM Qisda AC socket Z37LC6D-UM
	551	MJH49414801	3D.0GK02.001	Supporter PRESS EGI 1.2T Supporter SECC(EGI) AC HOLDER
	801	MGJ49418002	3K.0GL01.001	Plate,Metal PRESS SECC 1.2T FRAME SECC METAL BAR TOP
	802	MGJ49418902	3K.0GL02.001	Plate,Metal PRESS SECC 1.2T FRAME SECC METAL BAR BOTTOM
	803	MGJ49418201	3K.0GL03.001	Plate,Metal PRESS SECC 1.2T FRAME SECC METAL BAR RIGHT
	804	AGU56906001	6K.0GL08.001	Plate Assembly SUPPORTER LEFT, METAL BAR ASSY INCLUDING FIBER
	805	MGJ49418101	3K.0GL05.001	Plate,Metal PRESS SECC 1.2T FRAME METAL BAR VERTICAL MIDDLE
	806	AGU56906102	6K.0GL09.002	Plate Assembly SUPPORTER METAL BAR H TOP + FIBER
	807	AGU56906302	6K.0GL10.002	Plate Assembly SUPPORTER METAL BAR H BOTTOM + FIBER
	808	MJH49418601	3K.0GL06.001	Supporter PRESS SECC 1.2T Supporter SECC(EGI) STAND SUPPORTER
	820	MGJ57813001	6K.0GM13.001	Plate,Shield PRESS EGI - SHIELD EGI TOP SHIELD
	821	MGJ57813601	6K.0GM14.002	Plate,Shield PRESS EGI - SHIELD EGI SHIELD BOTTOM
	830	AAN56905602	6K.0GL11.012	Base Assembly STAND Z37LC6D LA75C Qisda BRACKET, Z37LC6D
⚠	900	AAN56905102	6K.0GL04.002	Base Assembly STAND Z37LC6D LA75C STAND BASE ASSY

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

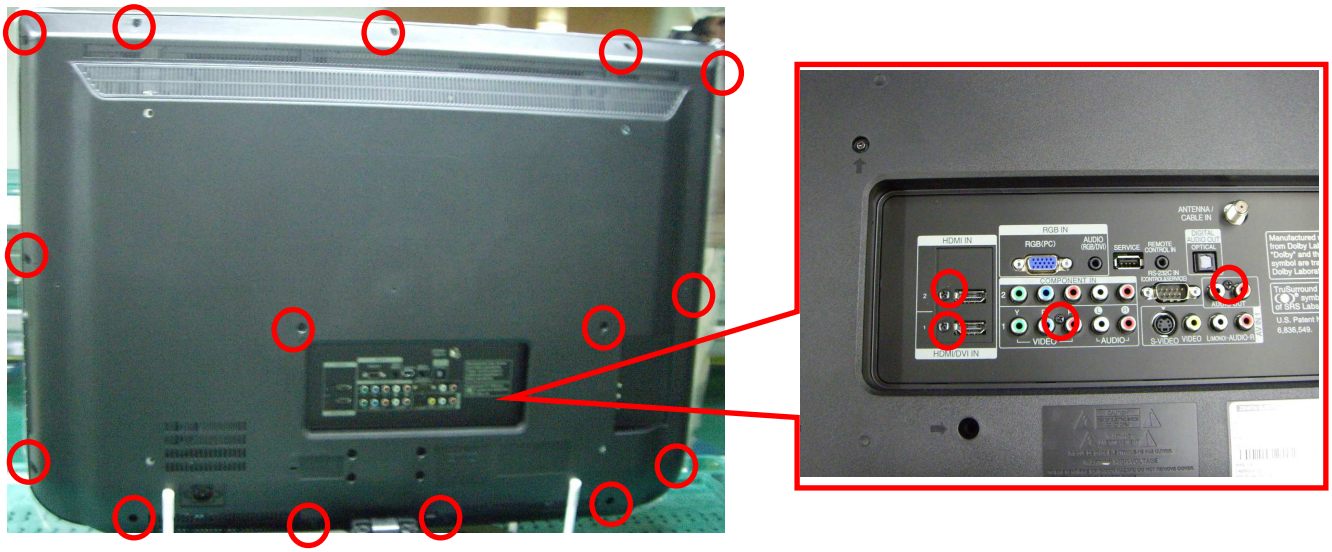
LGE Internal Use Only

2.2 DISASSEMBLY

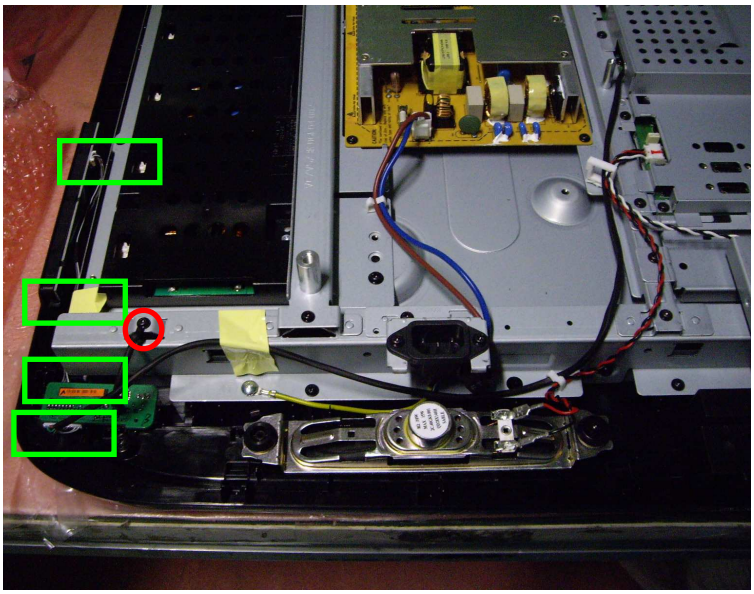
2.2.1 Disassembly part: Base/Rear Cover/Keypad BD/IR BD/Main BD/Power BD/Side AV BD

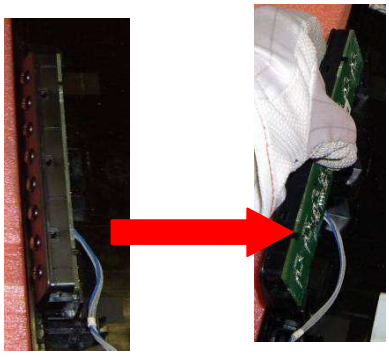
Step1: Remove Base

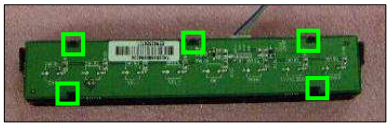
Step2: Remove Rear Cover



Step3: Remove Keypad BD and IR BD



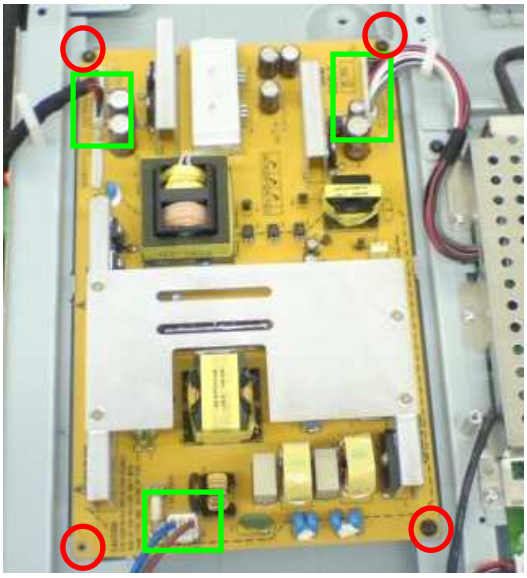




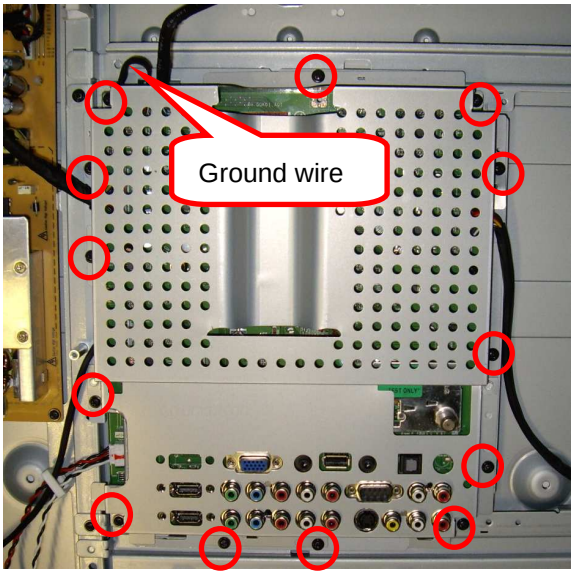
Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

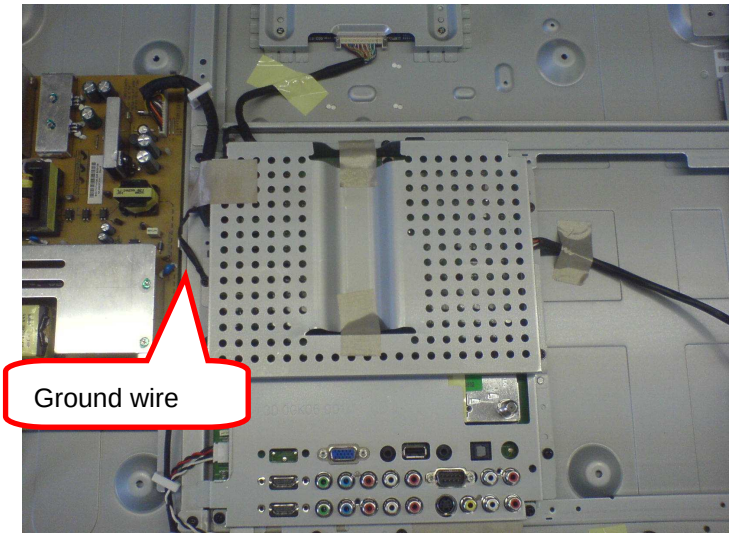
LGE Internal Use Only

Step4: Remove Power BD



Setp5: Remove Main TOP SHD



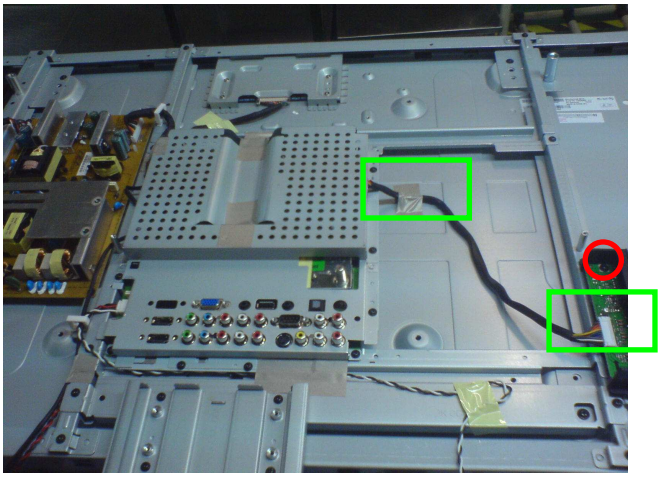


Setp6: Remove Main BD、Main BD　BOM SHD

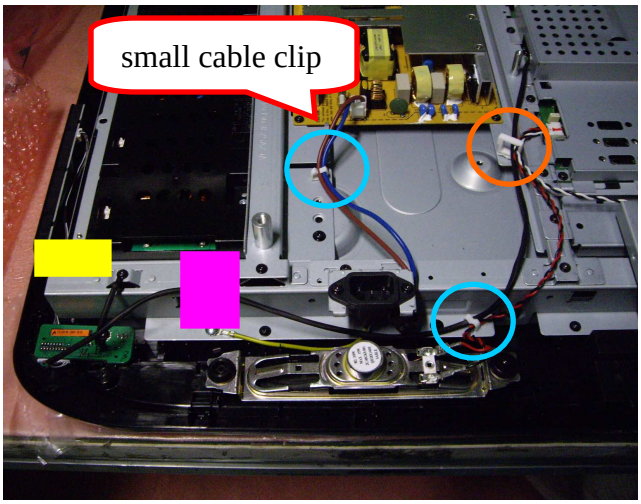
Copyright © 2008 LG Electronics. Inc. All right reserved.

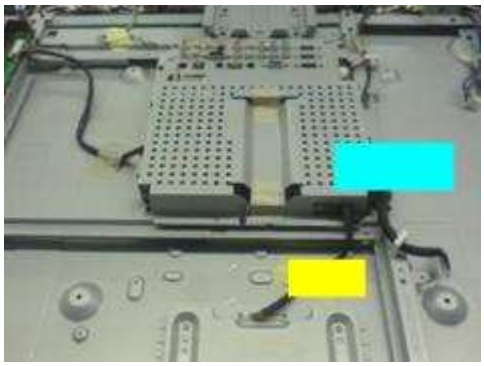
LGE Internal Use Only
Only for training and service purposes

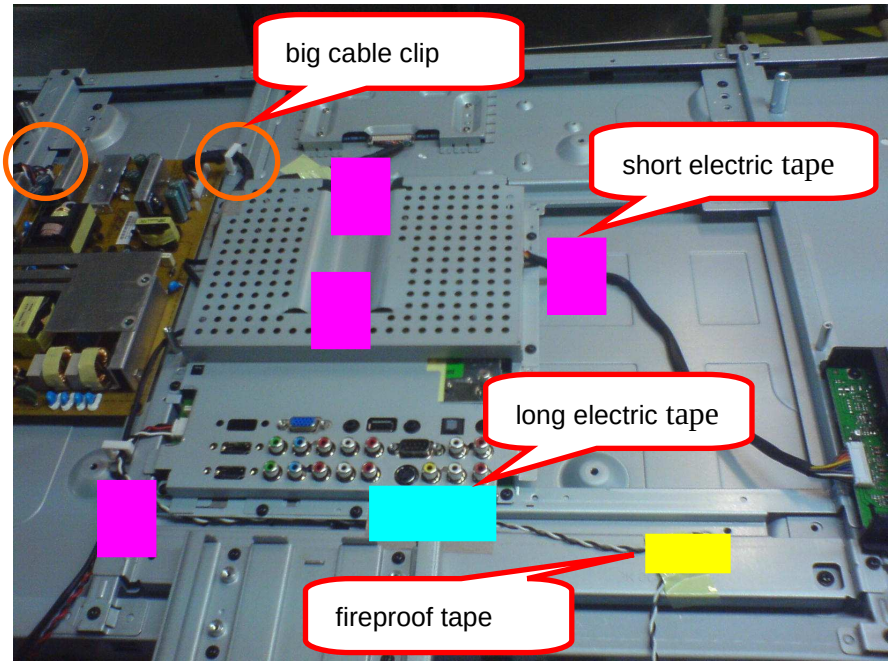
Step 7: Remove Side AV BD



Step 8: Arrange the wire



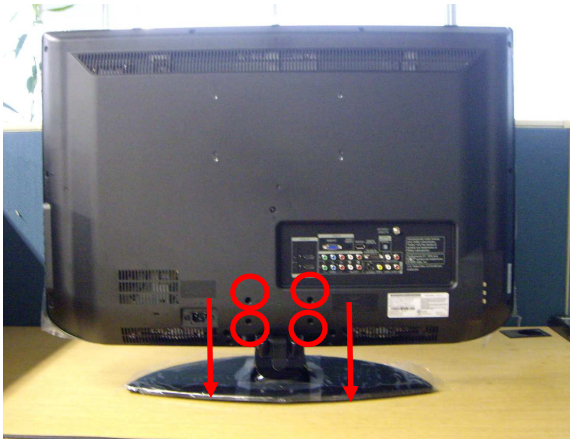




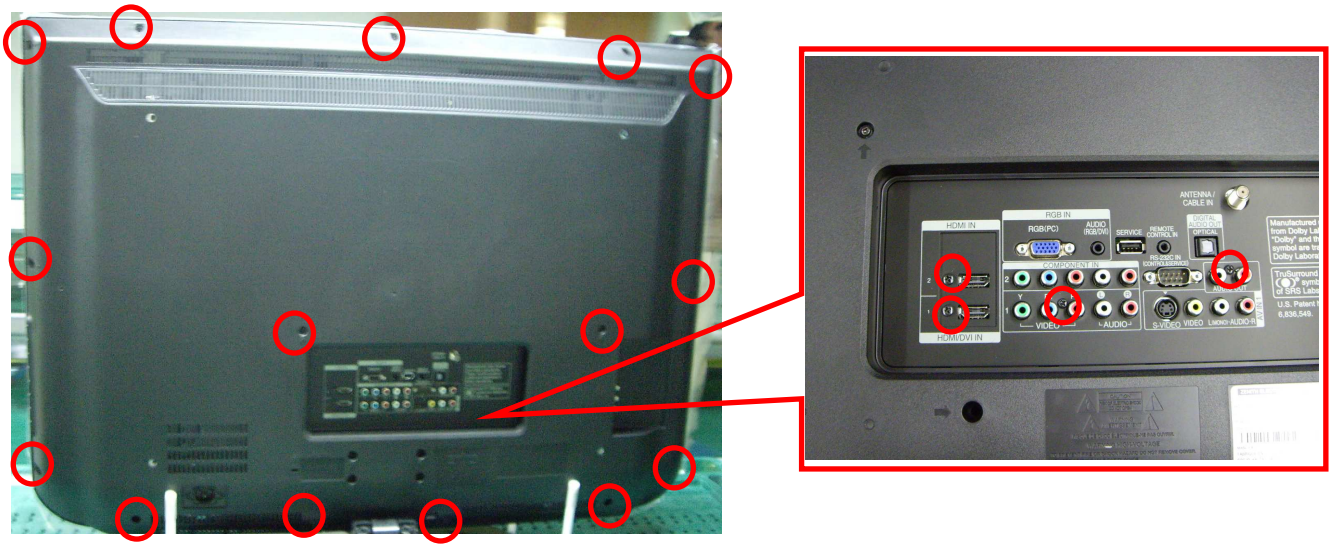
Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

2.2.2 Disassembly Part: Speaker

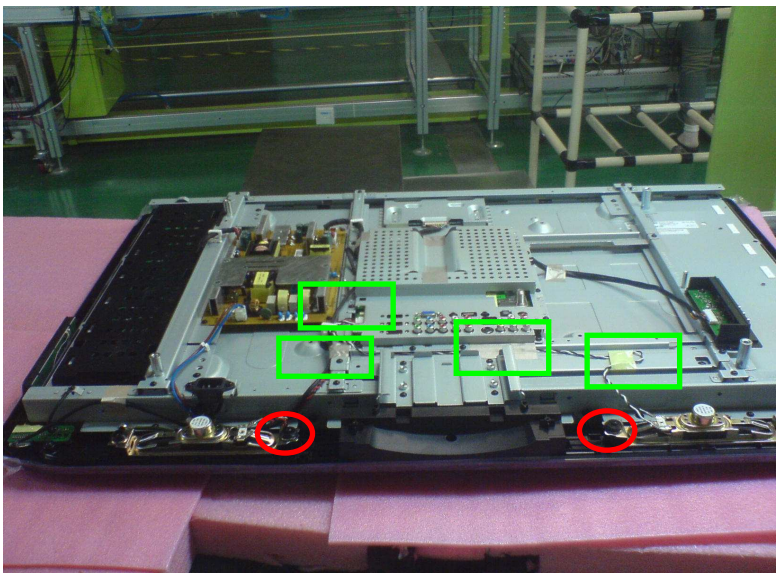
Step 1: Remove Base



Step 2: Remove Rear Cover



Step 3: Remove Speaker

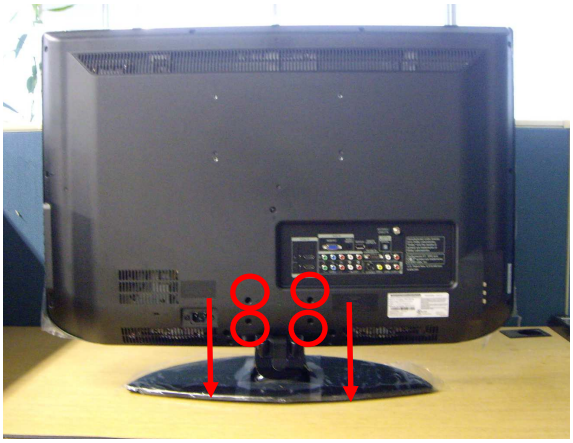


Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

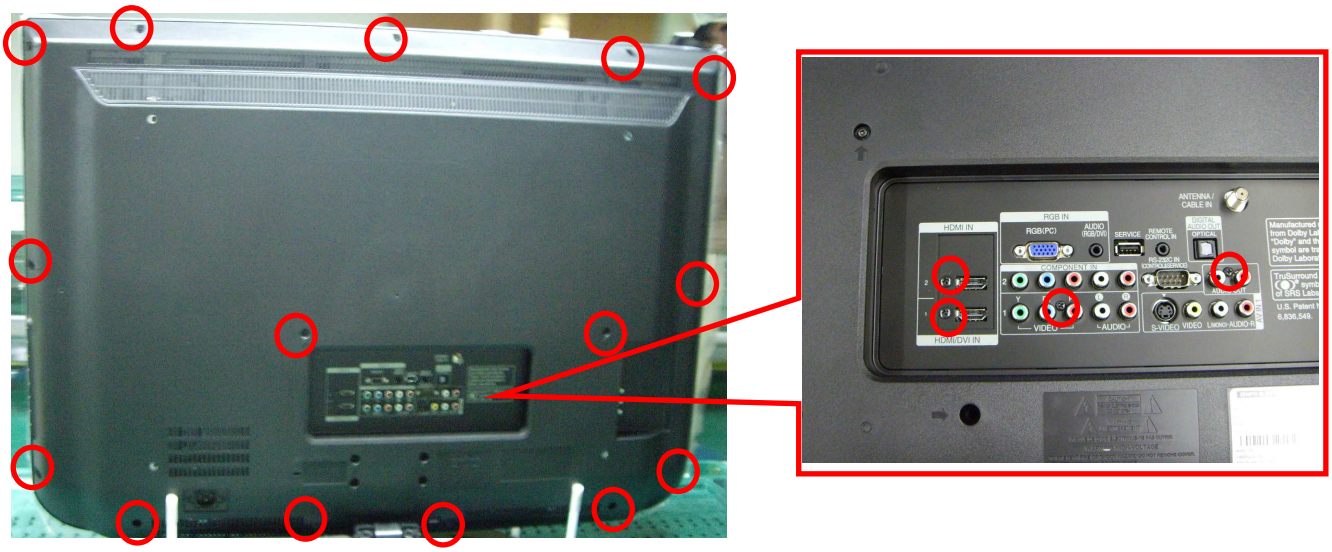
LGE Internal Use Only

2.2.3 Disassembly Part: Bezel/Panel

Step1: Remove Base

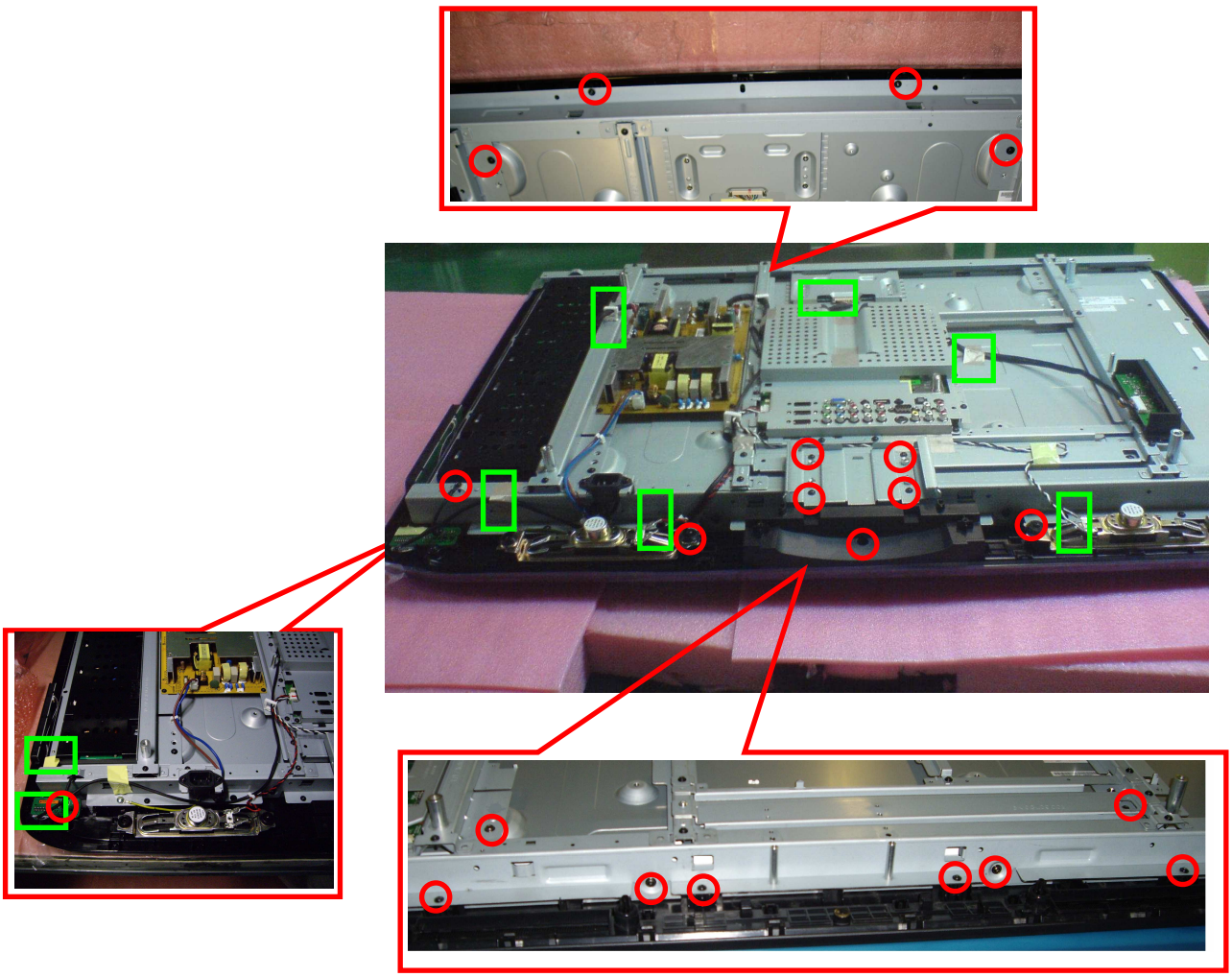


Step2: Remove Rear Cover



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

Step3: Remove Frame & PCBA



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

2.3 SCREW TORQUE

ITEM	SCREW P/N	DESCRIPTION	Q'TY	TORQUE (KGF-CM)	WHERE USE
1	8F.VG334.8R0	SCRW TAP PH W/F M3*6 TP-S B-ZN	44	6-8	FRM TOP—FRM RIGHT*1 FRM TOP—FRM LEFT*1 FRM TOP—FRM V MID*1 FRM DOWN—FRM RIGHT*1 FRM DOWN—FRM LEFT*1 FRM DOWN—FRM V MID*1 FRM V MID—FRM H TOP*1 FRM V MID—FRM H DOWN*2 FRM RIGHT—FRM H TOP*1 FRM RIGHT—FRM H DOWN*2 STD HOLDER CVR—FRM H DOWN*2 STD HOLDER CVR—FRM DOWN *2 POWER BD—FRM LEFT*2 POWER BD—FRM V MID*2 FRM RIGHT—SIDE BD*1 MAIN TOP SHD—FRM H TOP*2 MAIN TOP SHD—FRM H DOWN*2 SHELF AC—FRM DOWN*1 SHELF AC—AC*2 Back cover—frm v mid*1 Back cover—frm right*1 MAIN TOP SHD – MAIN BOTTOM SHD *9 MAIN BOTTOM SHD –MAIN BD*4 EMI wire of IR –FRM DOWN*1
2	8F.00555.120	SCRW TAP RH W/FL M3*12L B-ZN	2	6-8	speaker—bezel*2

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

3	8F.8E356.240	SCRW M M4*24L EXT/TOO B-ZN NYL	4	8-10	neck—frame*4
4	8F.00535.100	STAND OFF M2.7*12.8L(S7)ZN	4	4-6	Main shd—D-SUB CONN *4
5	8f.00559.100	SCRW TAP FH M3*10L C-ZN	16	6-8	Plt base—base cover*8 PLASTIC NECK—NECK SKELETON*8
6	8F.EA226.130	SCRW TAP TRU M4*12L B-ZN	5	8-10	Plastic neck—plt base*5
7	8f. SA324.8r0	SCRW TAP BIND M3*8L B-ZN	2	4-6	hdmi—connector cover*2

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

8	8F.PA324.100	SCRW TAP PH M3*10L B-ZN	2	4-6	Connector cover—AV connector
9	8F.00530.8R0	SCRW TAP TRU W/EXT M4*8L ZN	1	6-8	AC—FRM DOWN
10	8F.1G326.6R0	SCRW MACH PH W/FL M4*6L B-ZN	6	6-8	PANEL—FRM RIGHT PANEL—FRM LEFT
11	8F.1G326.140	SCRW MACH PH W/FL M4*14L B-Z	4	6-8	PANEL—FRM TOP*2 PANEL—FRM DOWN*2
12	8f.UG324.120	SCRW TAP PH W/FL PT M3*12L B-Z	27	6-8	IR BD-BEZELx1 Back cover—bezel*11 FRM TOP—bezel*2

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

					FRM DOWN—bezel*4 Stand cvr—bezel*1 Connector cover—back cover*4 Speaker COVER—bezel*2 Stand cvr-BACK COVER*2

Total Screw Type: 12
Total Screw Q'TY: 115

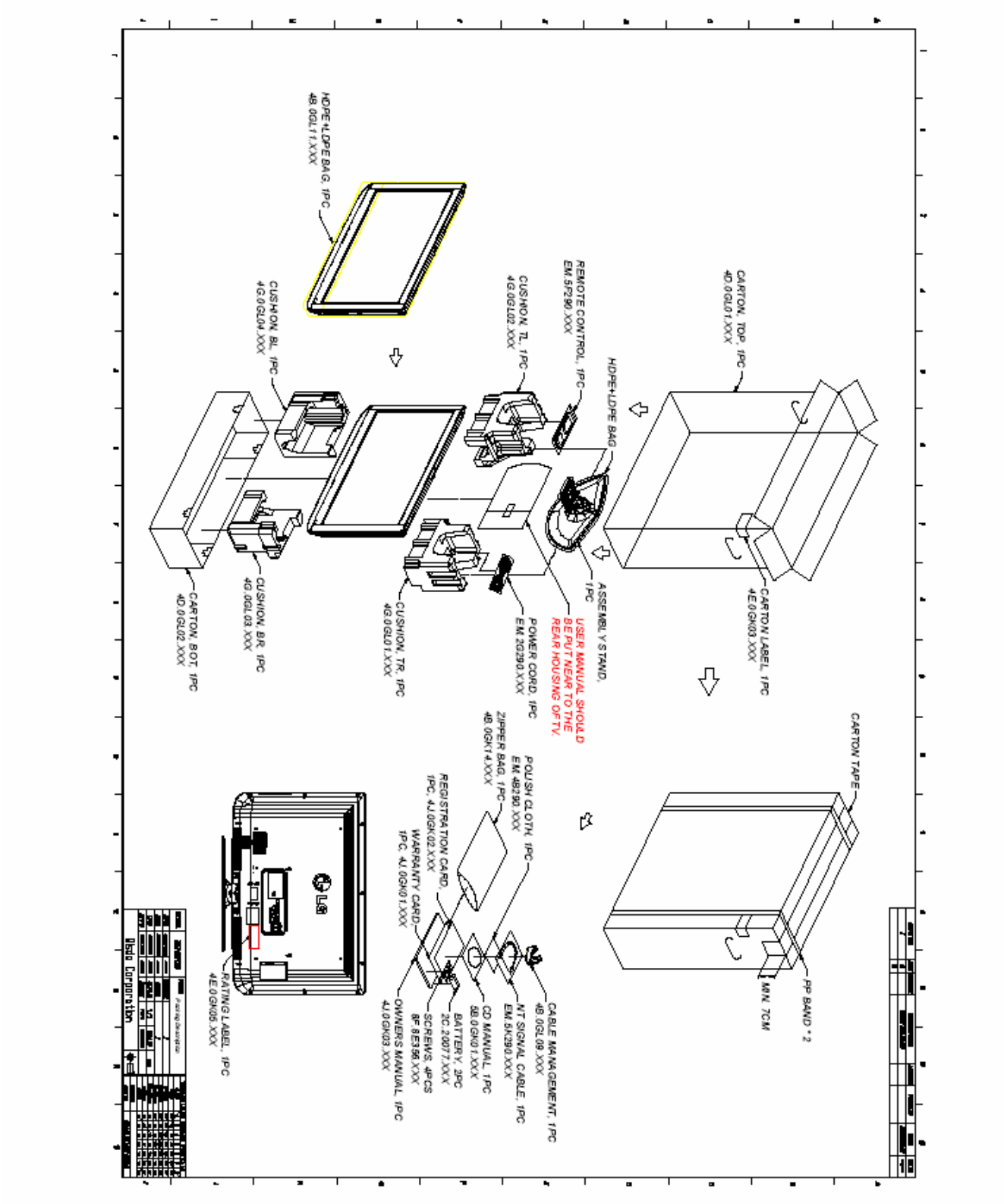
Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

2.4 OPERATION FOR PACKING.

*) CARTON LABEL (4E.0GK03.XXX) LOCATION:

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

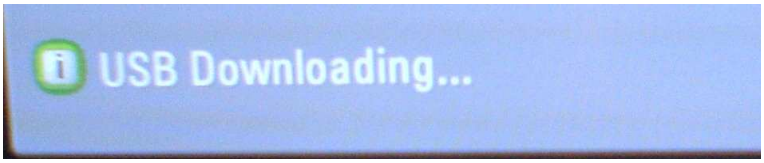
3 FW Download Method

Procedure of USB Download (Service Only, App. code)

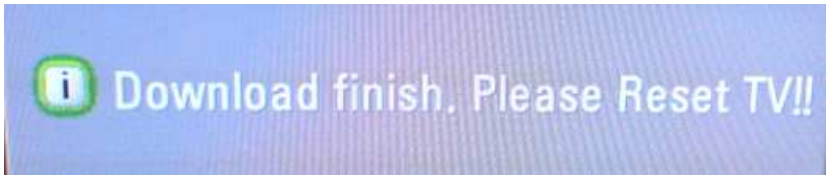
This method will update application code only.

Step 1. Plug in USB with *LG.ECC* file in root directory.

Step 2. USB Downloading appears on TV screen.



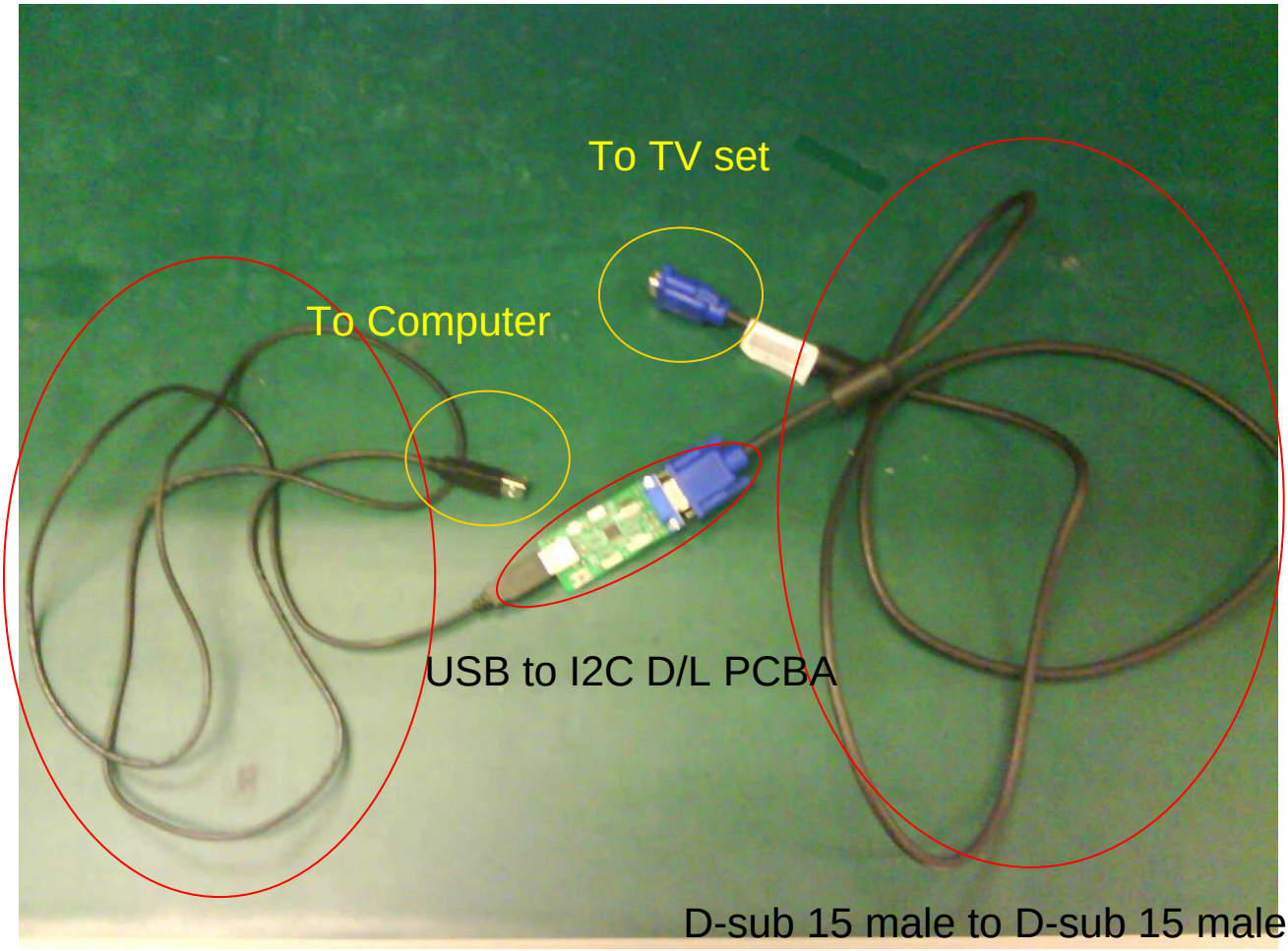
Step 3. Download finished. Remove USB and restart TV.



Copyright © 2008 LG Electronics. Inc. All right reserved.

Only for training and service purposes

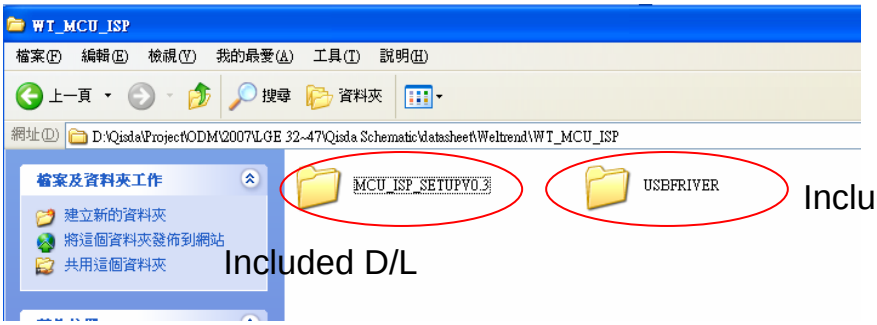
4 Introduction of D/L jig for Sub-Micron



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

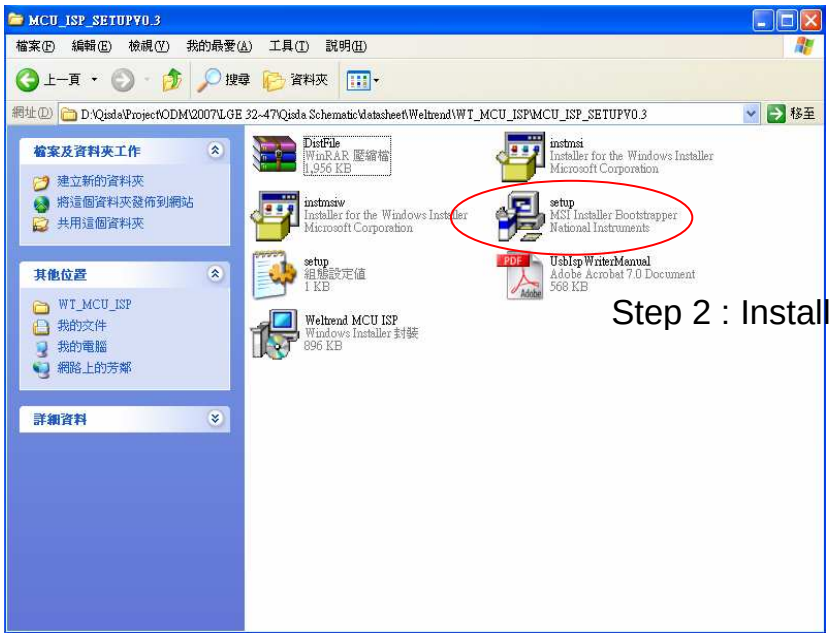
D/L procedure for Sub-Micron



Included USB driver of D/L

Included D/L

Step 1 : connect D/L board to USB port. Install USB driver of D/L board.



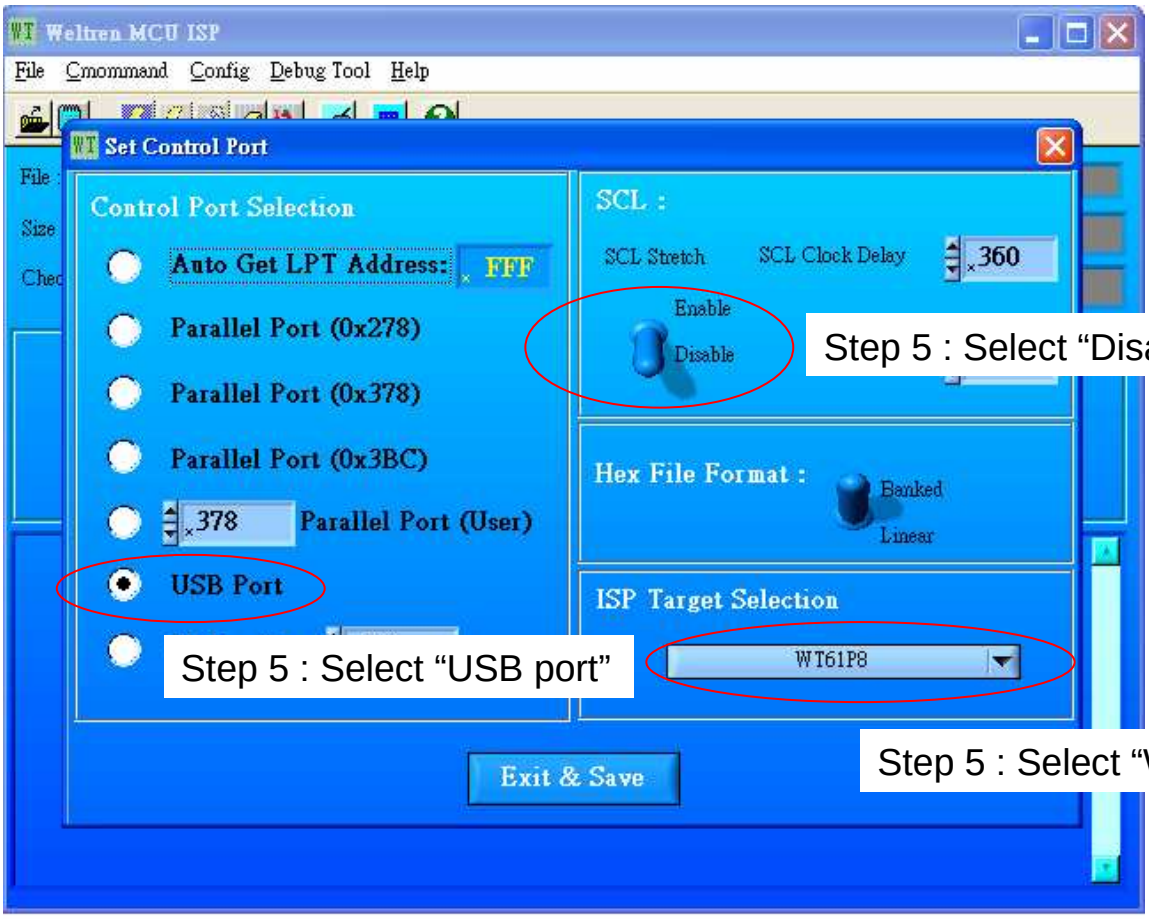
Step 2 : Install execution file of D/L

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

Step 3 : Execute D/L program

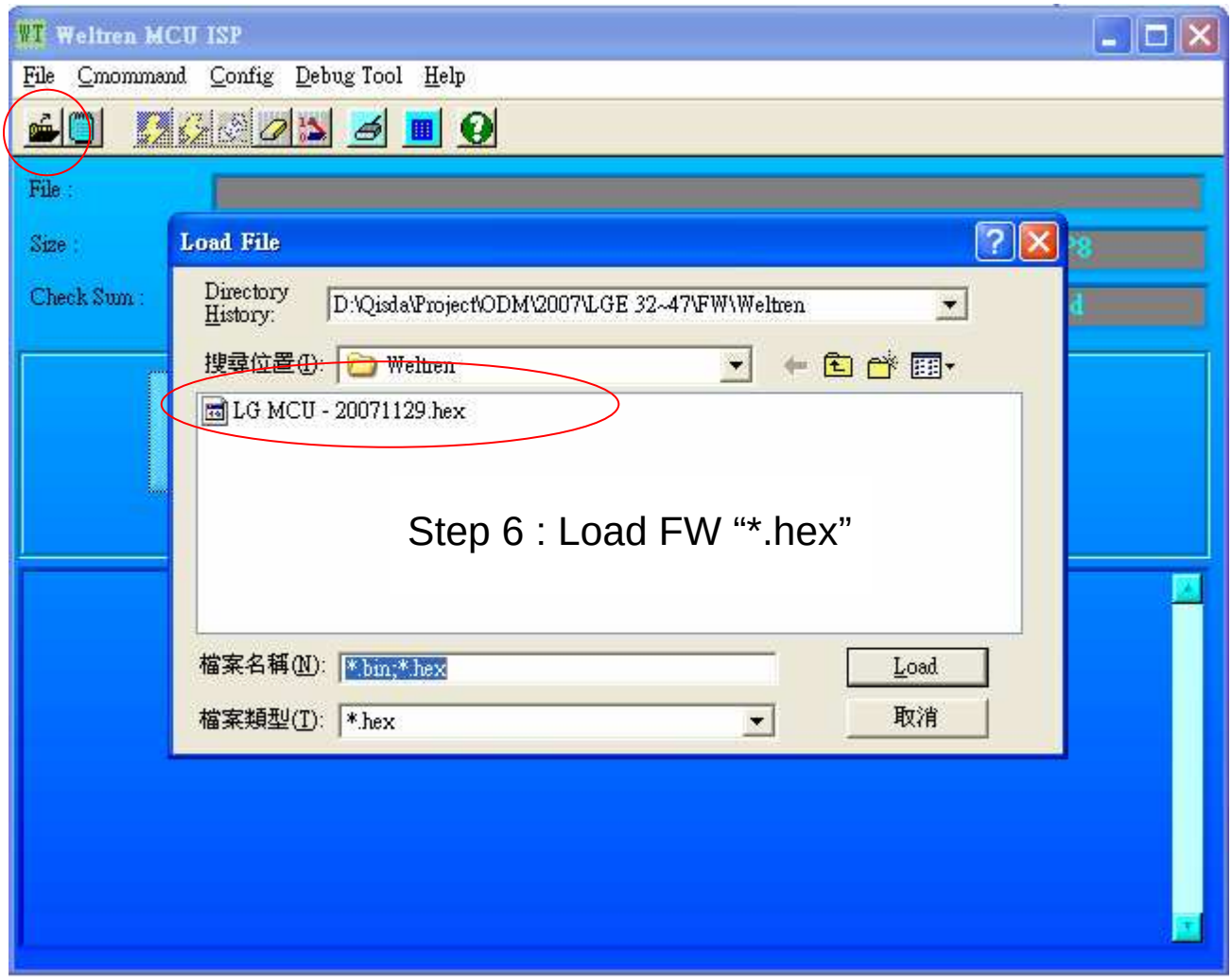
Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only



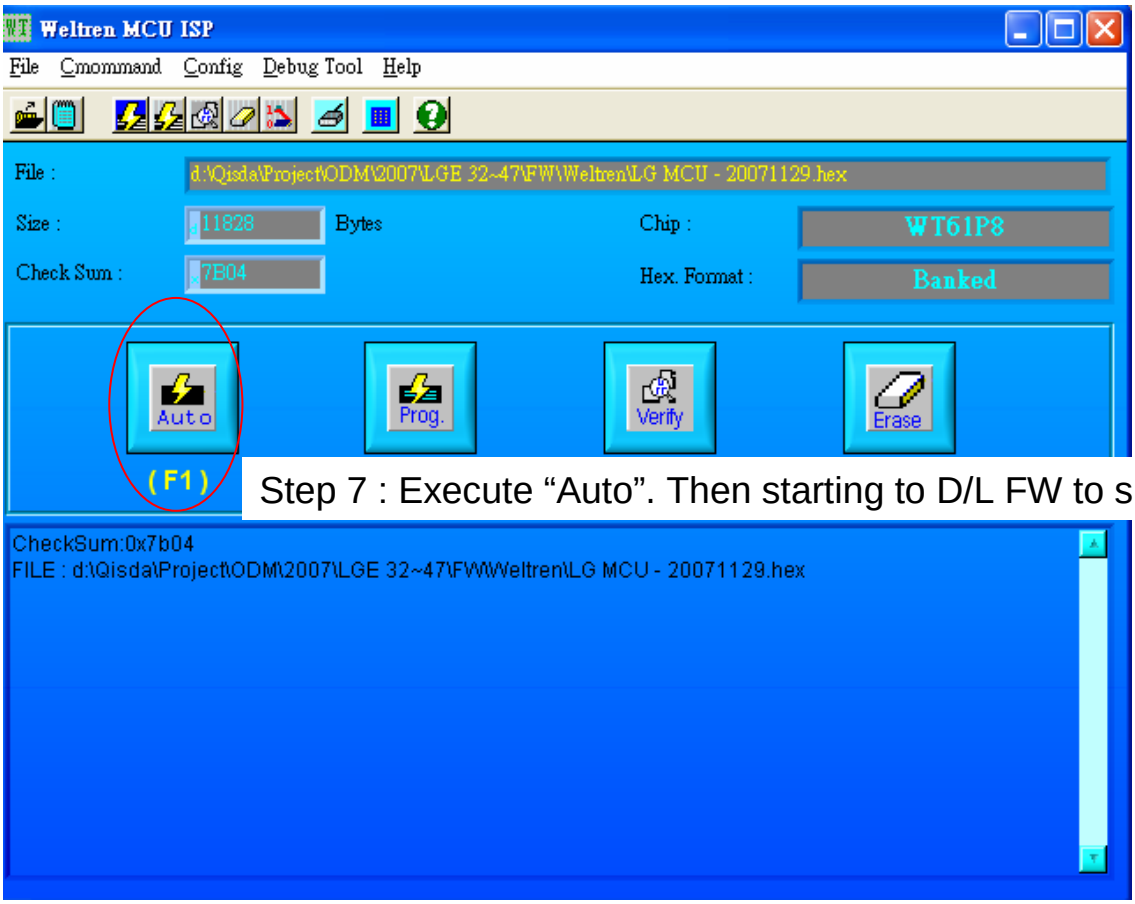
Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

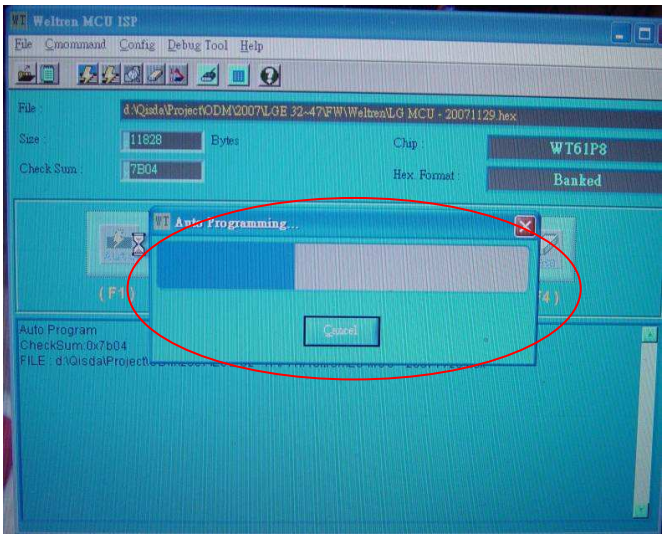
LGE Internal Use Only

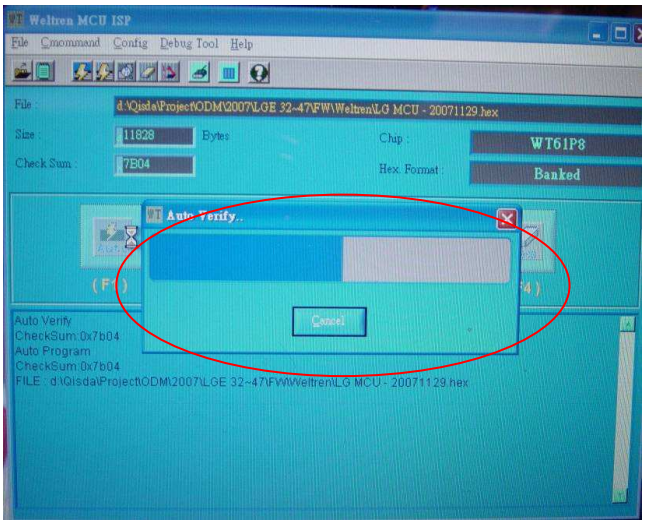


Step 7 : Execute “Auto”. Then starting to D/L FW to sub-Micron

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

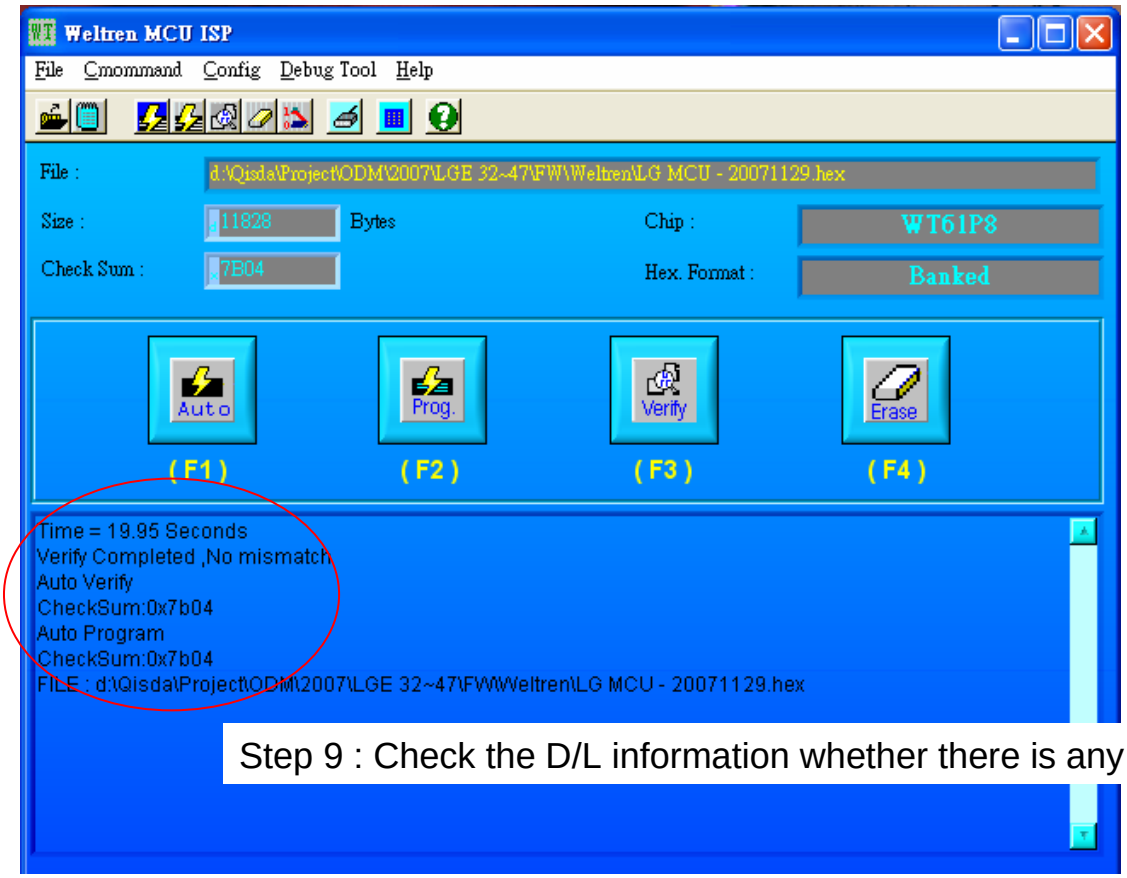
LGE Internal Use Only





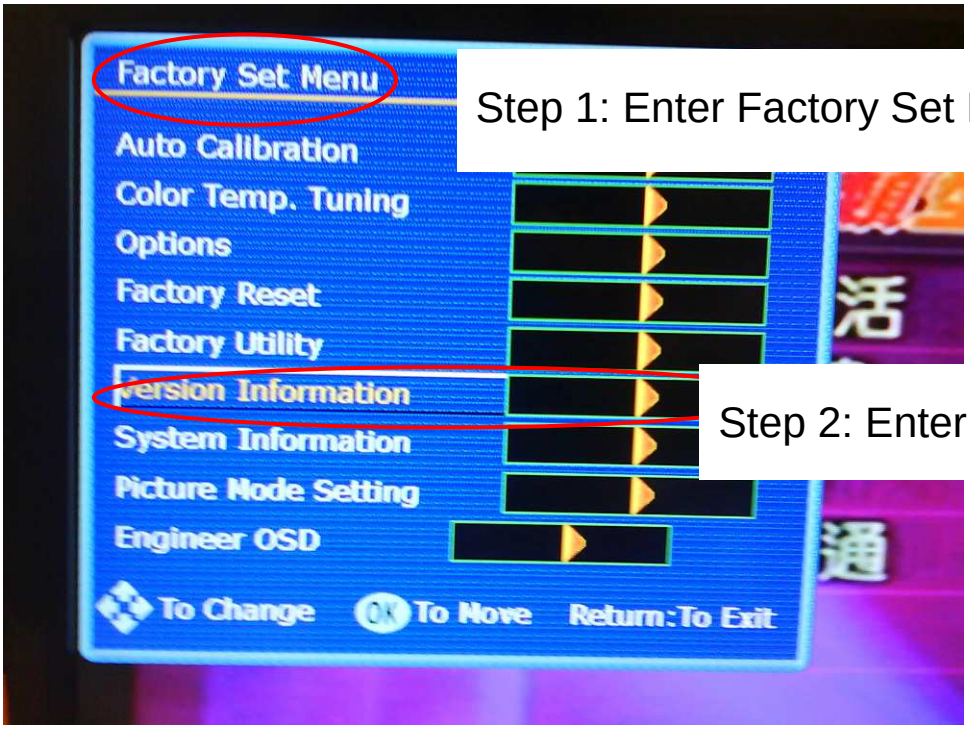
Step 8 : Auto Programming and Auto Verify.

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes



Step 9 : Check the D/L information whether there is any mismatch.

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

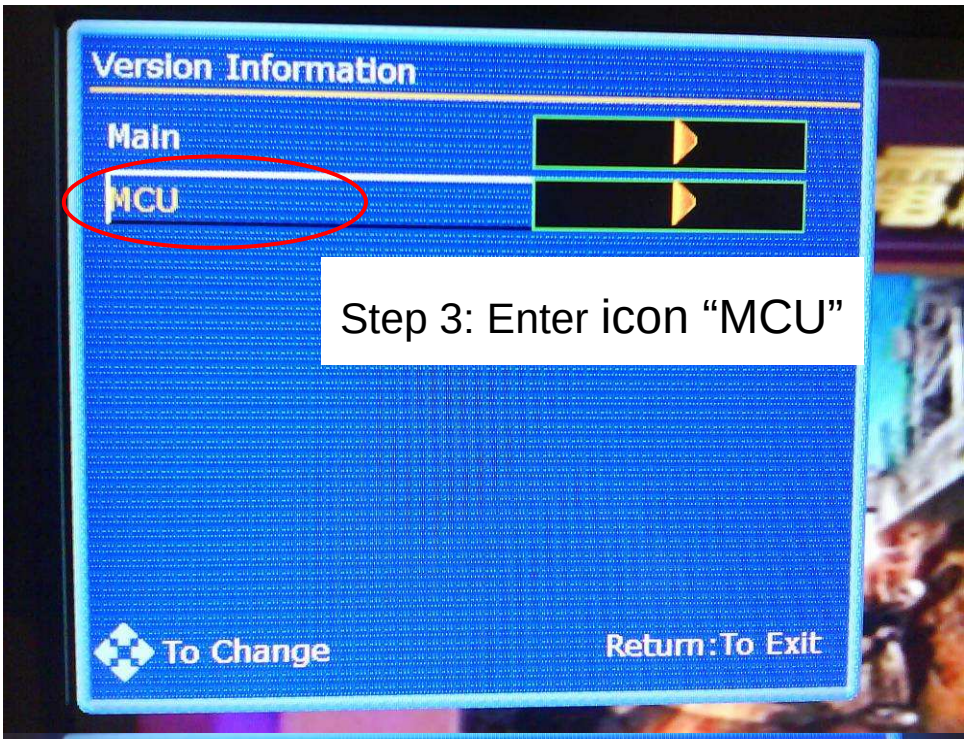


Step 1: Enter Factory Set Menu

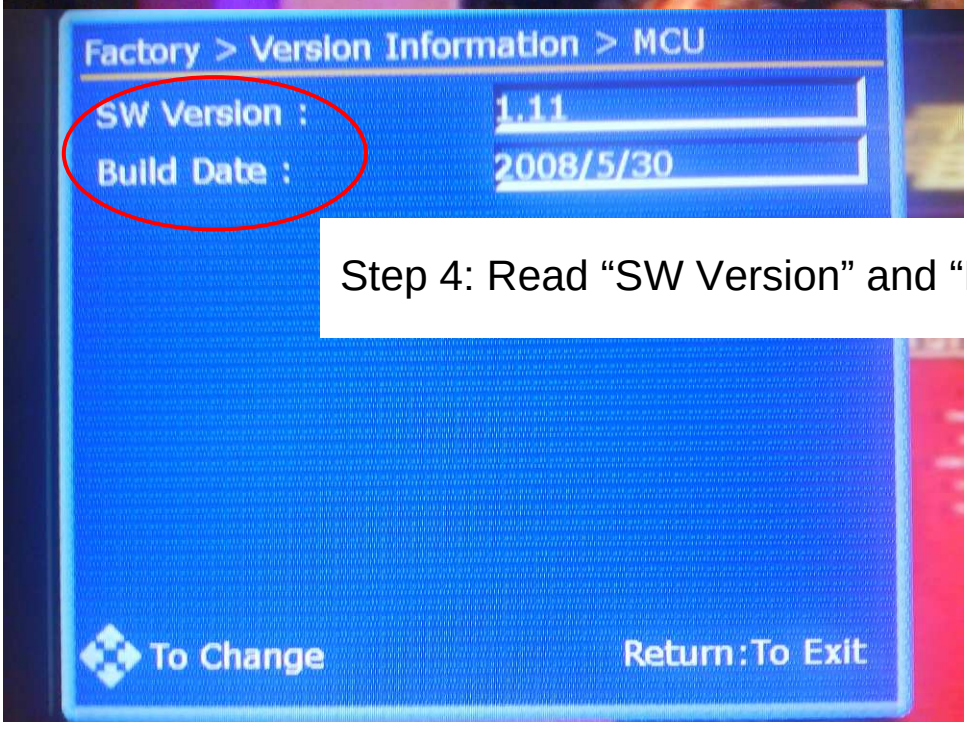
Step 2: Enter icon “Version Information”

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only



Step 3: Enter icon “MCU”



Step 4: Read “SW Version” and “Build Date”

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

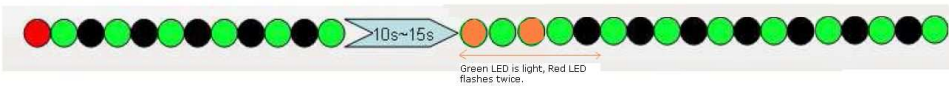
LGE Internal Use Only

5 TROUBLE SHOOTING

5.1 Check TV set Initiation (LED status)

Normal Start

Start Failure



When start failure happens, please download Flash again. First, set Factory RS-232 communication mode at "Debug" mode and then follow the procedure below. (Please refer other methods at C323 document)

iDev Download Procedure (FLASH)

Step 1. start iDev software and click setup

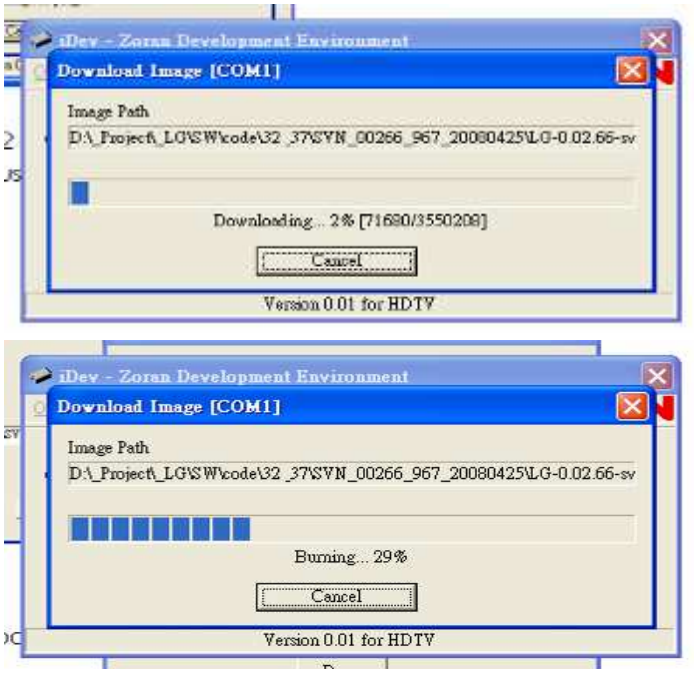
Step 2. At setup menu, select ***Image Path*** for Software to download and click ***Update boot sector***. Finally, click ***ok*** go back to iDev home menu.

Copyright © 2008 LG Electronics. Inc. All right reserved.

Only for training and service purposes

Step 3. Click ***down*** bottom.

Step 4. Plug in RS-232 down-load cable. Press keypad "***Volume*** →" and "***menu***" simultaneously, and then press "***power on***" bottom.



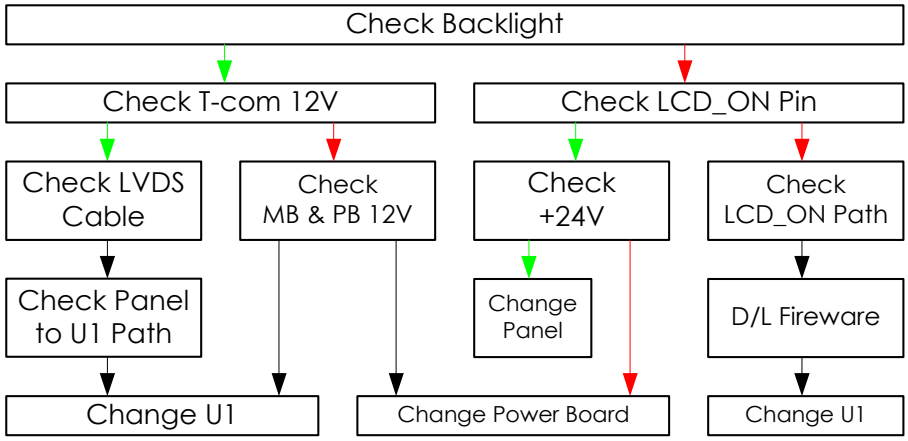
Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

Step 5. Finally, FW is finished, please reset TV.

5.2 No Video, No Backlight, No OSD

After normal start, if no video or no backlight or no OSD happens, please follow trouble shooting steps below.

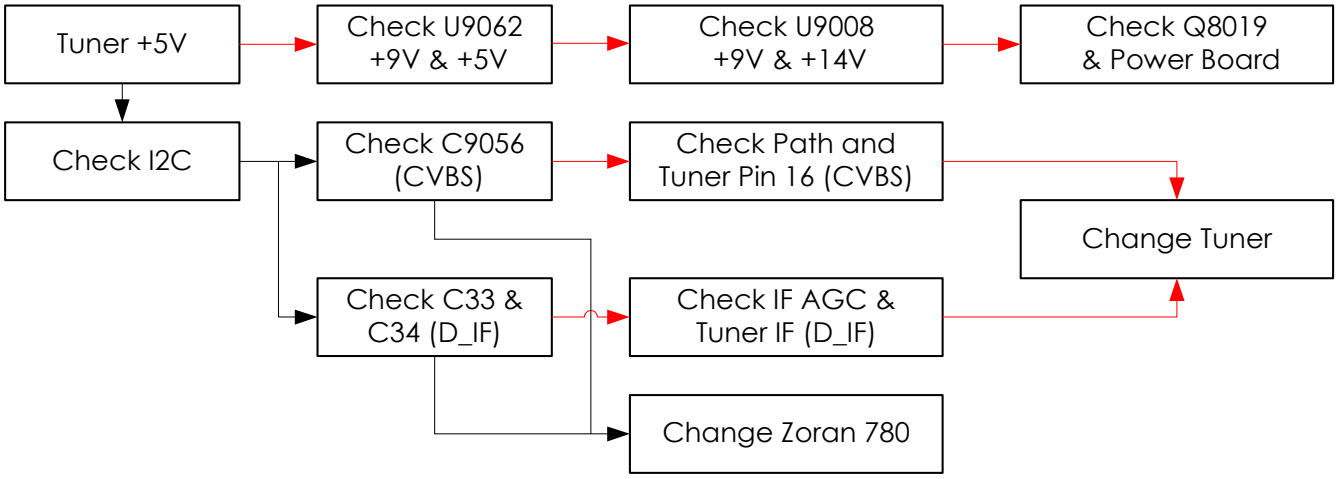


Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

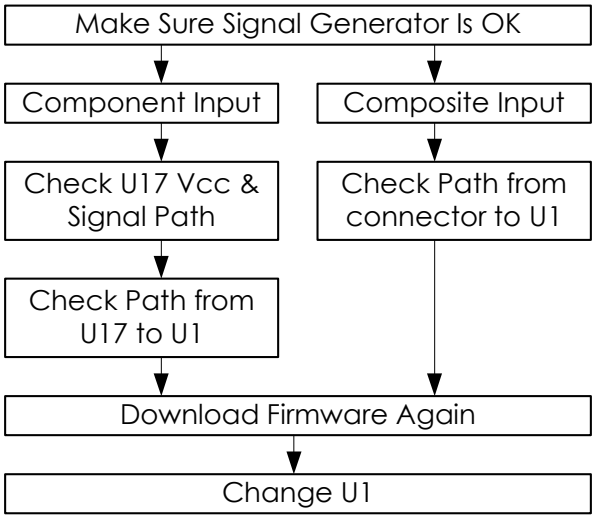
5.3 Tuner Input shows “No Signal”

At tuner mode(Air, Cable), if “No Signal” happens, check TV cable first. If cable signal is good, please follow the steps below.


Tuner +5V
Check U9062 +9V & +5V
Check U9008 +9V & +14V
Check Q8019 & Power Board
Check I2C
Check C9056 (CVBS)
Check Path and Tuner Pin 16 (CVBS)
Change Tuner
Check C33 & C34 (D_IF)
Check IF AGC & Tuner IF (D_IF)
Change Zoran 780

5.4 Component 1, Component 2, AV1 and AV2 Inputs show “No Signal”

At Component or Composite mode, if “No Signal” happens, please follow the steps below.

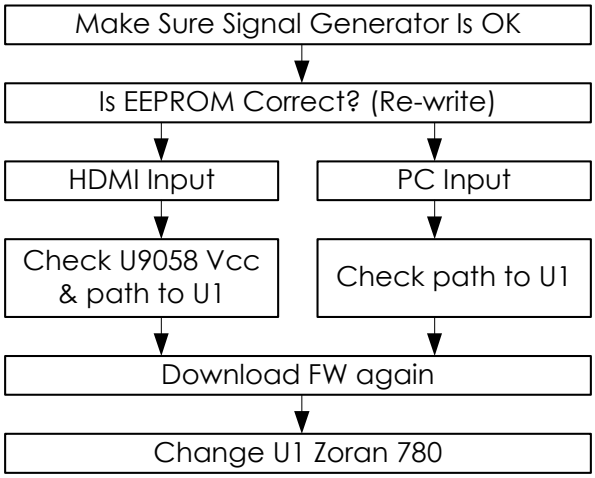

Make Sure Signal Generator Is OK
Component Input
Composite Input
Check U17 Vcc & Signal Path
Check Path from connector to U1
Check Path from U17 to U1
Download Firmware Again
Change U1

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

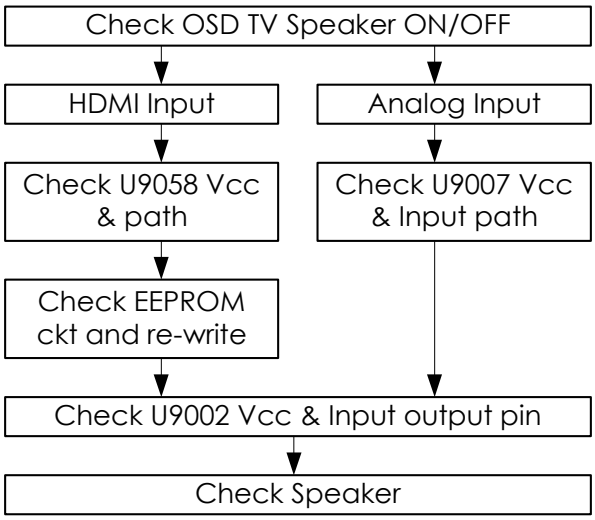
5.5 HDMI 1, HDMI 2, HDMI 3 and PC Inputs show “No Signal”

At HDMI or PC mode, if “No Signal” happens, please follow the steps below.


Make Sure Signal Generator Is OK
Is EEPROM Correct? (Re-write)
HDMI Input
PC Input
Check U9058 Vcc & path to U1
Check path to U1
Download FW again
Change U1 Zoran 780

5.6 No Sound

If TV no sound happens, please follow steps below.


Check OSD TV Speaker ON/OFF
HDMI Input
Analog Input
Check U9058 Vcc & path
Check U9007 Vcc & Input path
Check EEPROM ckt and re-write
Check U9002 Vcc & Input output pin
Check Speaker

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

6 ALIGNMENT.

Alignment Theorem and Procedure

6.1.1 Setup

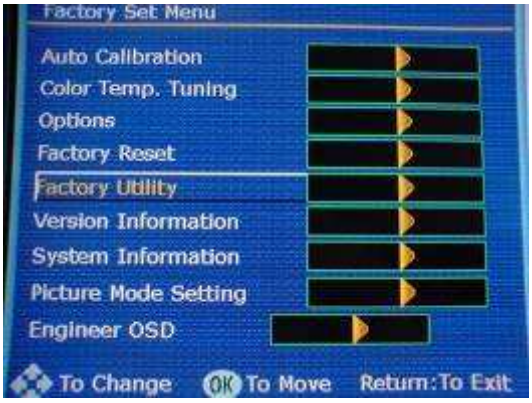
a) Power on and enter factory mode to “Factory Reset” → “Reset All NVRAM Setting”. (See picture 1~2)

b) Plug in test pattern or select “Factory Utility” in factory mode, activate “Burn In Mode”. (See picture 3~4)

c) Warm up at least 1 hour.

Picture 1

Picture 2



Picture 3

Picture 4

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

6.1.2 Spec and Default Settings

a) System Gamma definition is S-curve based on LGE PQ set and also is generated based on the color temperature Cool, Medium and Warm (see below definition).

b) Spec of color temperatures (for RD development stage)

Color Temp.	x	y	Tolerance
Cool	0.276	0.283	±0.002
Medium	0.285	0.293	±0.002
Warm	0.313	0.329	±0.002

c) Default settings

- Component with NTSC signal

Color Temperature(NTSC)	Cool	Medium	Warm
Red Gain	50.00	50.00	50.00
Green Gain	50.00	50.00	50.00
Blue Gain	50.00	50.00	50.00
Red Offset	50.00	50.00	50.00
Green Offset	50.00	50.00	50.00
Blue Offset	50.00	50.00	50.00

Note: RGB gain/offsets are in the range from 48 to 52 is suggested.

6.1.3 Color Temperature Alignment and Theorem

a) Measurement equipment and condition

- Equipment

Color Meter: Minolta CA210 or equivalent

Signal Generator: Astro VG859 or equivalent

- Condition

Measurement Point: Center of screen

Measurement Distance: 50mm

Measurement Angle: 90 degree

b) Adjustment method

First, correct signal level is a must. Front-end video digital level is calibrated and implemented as default in software. Since analog signals are processed via ADC, we need to calibration three signals “AV-CVBS” “PC”

Copyright © 2008 LG Electronics. Inc. All right reserved.

Only for training and service purposes

“Component”. Choosing the first item “Auto Calibration” in factory mode will reach this basic requirement. The detail calibration method is shown at section 1.4.1. After signal calibration, we can go to next step, color temperature alignment. The default calibration values are as below

	AV-CVBS NTSC	Tuner-CVBS NTSC
Contrast	134	156
Brightness	33	15
Saturation	173	209
Hue	128	128

	Component NTSC	PC 1024x768@60Hz
Digital R Gain	642	702
Digital G Gain	636	700
Digital B Gain	643	708
Digital R Offset	1741	2033
Digital G Offset	2010	2033
Digital B Offset	1741	2033
Analog R Gain	0	0
Analog G Gain	0	0
Analog B Gain	0	0
Analog R Offset	240	128
Analog G Offset	192	128
Analog B Offset	240	128

Below are basic concepts of adjusting RGB gain/offset that can meet spec requirement. When tuning white balance (color temperature), we manually adjust R, G and B gain and offset by following below rules to satisfy spec requirement.

	x	y
Red gain ↓	x ↓	-
Green gain ↓	-	y ↓
Blue gain ↓	x ↑	y ↑
Red offset ↑	x ↑	-
Green offset ↑	-	y ↑
Blue offset ↑	x ↓	y ↓

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

Suggestion is not to adjust Green gain and offset, both will affect luminance and Gamma. We adjust Red and Blue gain to check 85% white to see if it is within spec. Eventually the settings of RGB gain/offset will converge to satisfy spec.

c) Maximum Luminance

After color temperature alignment, the maximum luminance should be greater than 325cd/m².

Condition:

Measurement Point: Center of screen

Measurement Distance: 50mm

Measurement Angle: 90 degree

Contrast: max (100)

Brightness: max (100)

Backlight: max (100)

Others: default

6.1.4 Alignment procedure in FA out processing

6.1.4.1 ADC Calibration

- In factory mode, choose “Factory Reset” → “Reset All NVRAM Setting”.
- Set Picture mode at Dynamic.

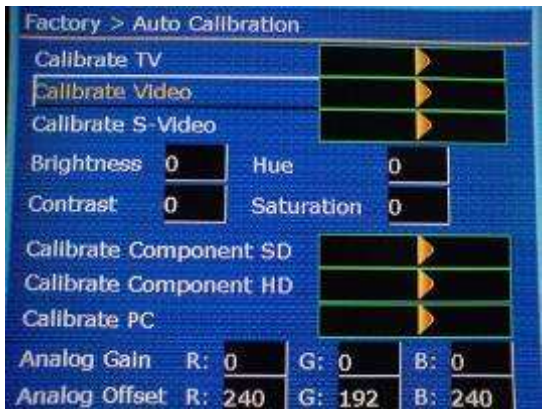
Using AV1-CVBS NTSC with Color Bar white 75% signal

a) Select input source AV1 of operation unit and plug in CVBS cable NTSC with Color Bar signal (Astro PG1 Timing968, Pattern968).

b) Press first item in factory menu “Auto Calibration” → “Calibrate Video” to execute calibration. (See picture 5~6)

c) The signal level from equipment (without any load) show as picture 7.

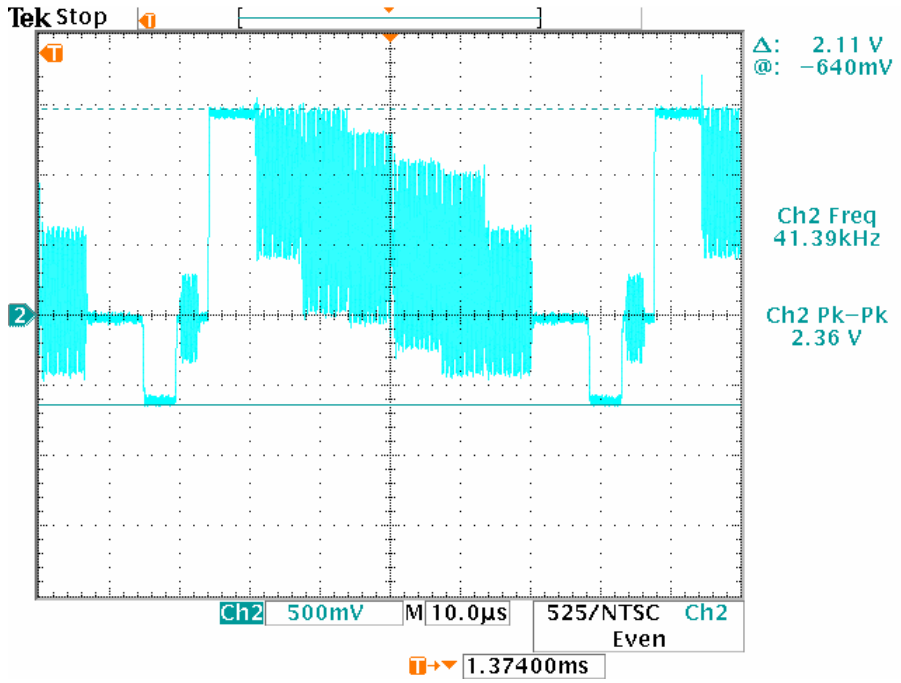
Picture 5



Picture 6

Copyright © 2008 LG Electronics. Inc. All right reserved.

Only for training and service purposes



Picture 7

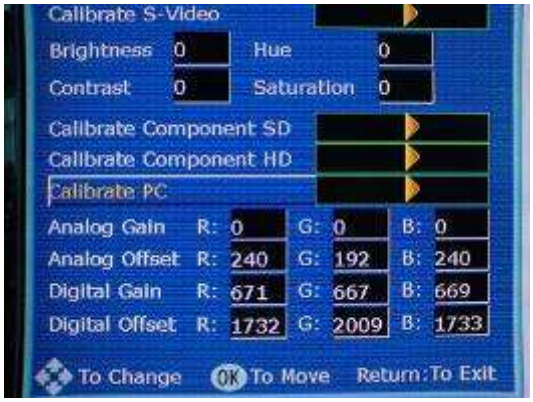
Using PC 1024X768@60Hz with 16 Gray Level signal

a) Select input source PC of operation unit and plug in PC cable 1024x768@60Hz with 16 Gray Level signal (Astro PG1 Timing856, Pattern921).

b) Press first item in factory menu “Auto Calibration” → “Calibrate PC” to execute calibration. (see picture 8~9)

c) The signal level show as picture 10-1~10-3. (respective R, G and B signals)

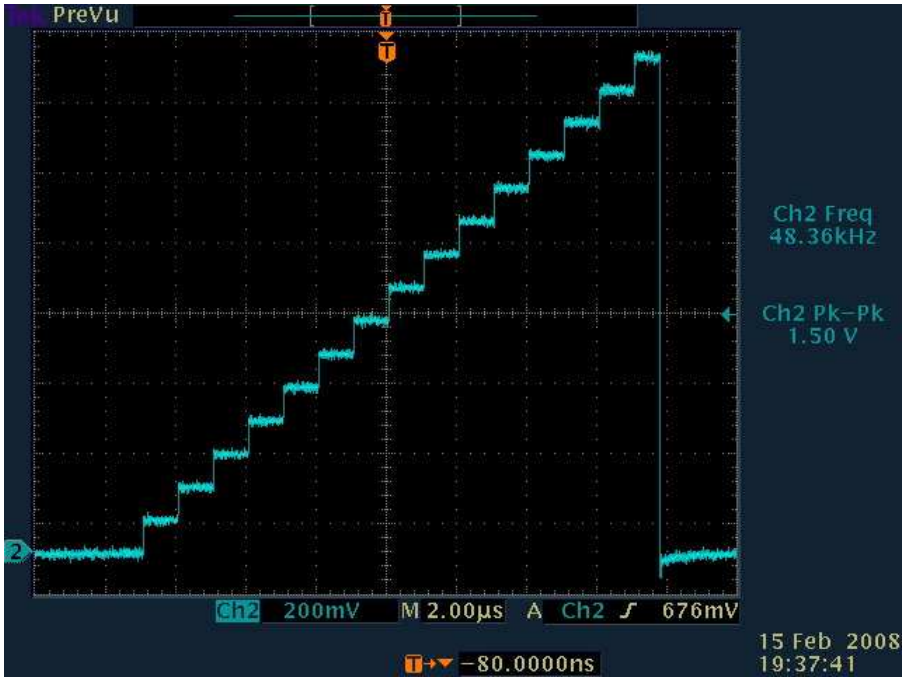
Picture 8



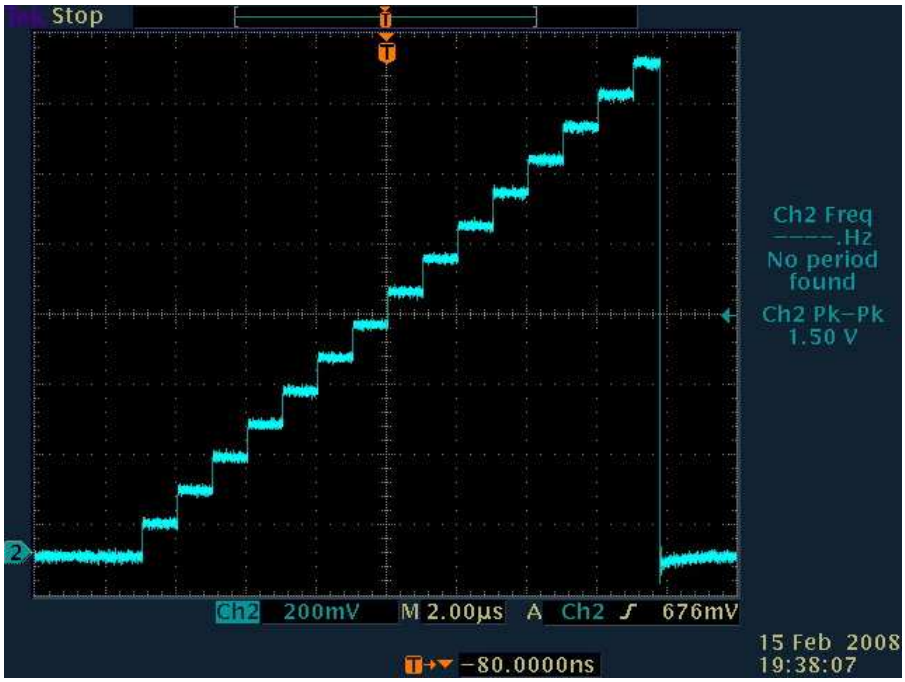
Picture 9

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only



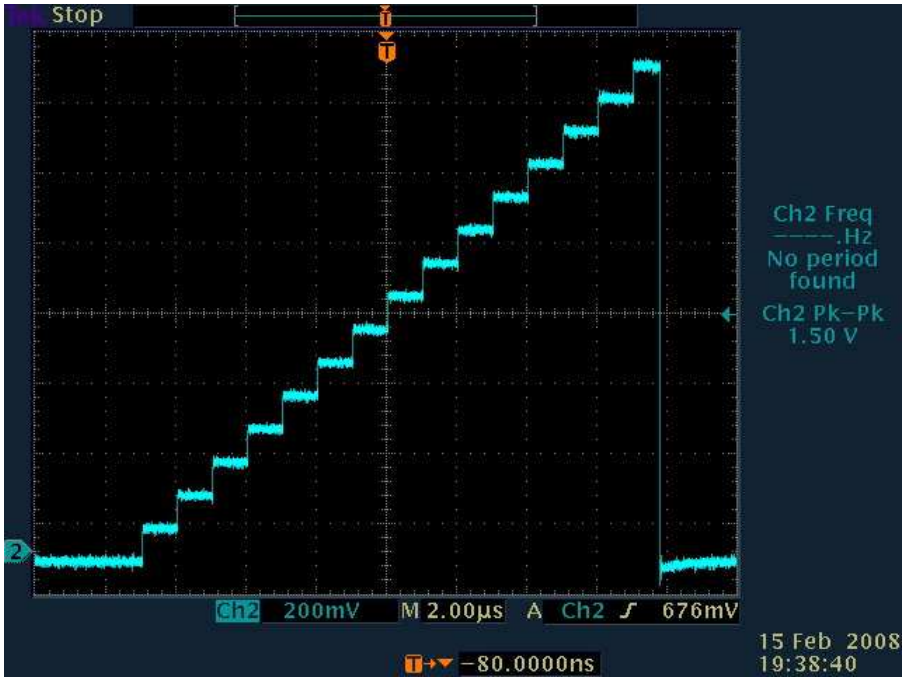
Picture 10-1



Picture 10-2

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes



Picture 10-3

Using Component1 NTSC with Color Bar white 75% signal

a) Select input source Component1 of operation unit and plug in component cable NTSC with Color Bar white 75% signal (Astro PG1 Timing968, Pattern968).

b) Press first item in factory menu “Auto Calibration” → “Calibrate Component SD” to execute calibration. (See picture 11~12)

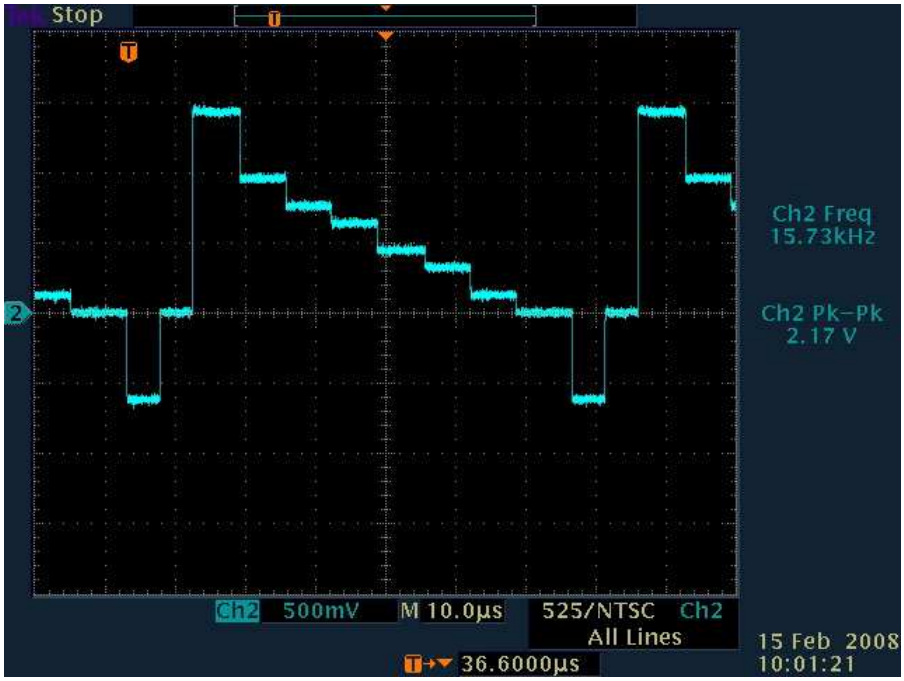
c) The signal level show as picture 13-1~13-3. (respective Y, Cb and Cr signals)

Picture 11

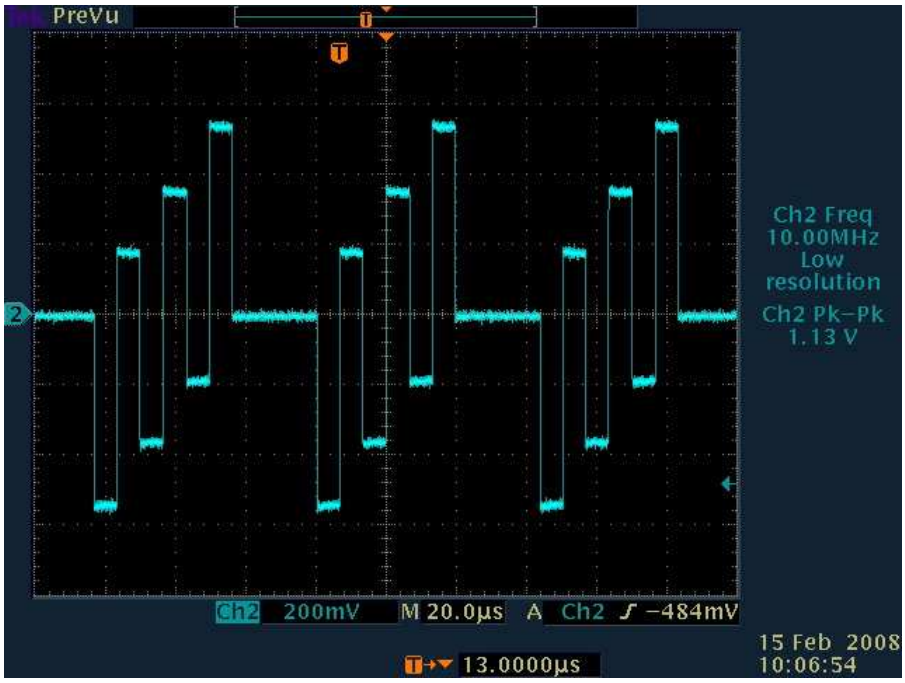
Picture 12

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes



Picture 13-1



Picture 13-2

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

Picture 13-3

6.1.4.2 Color Temperature Alignment

Component (NTSC)

Using 85% white pattern to adjust values of gain of R and B for cool, medium and warm until color temperature is within spec, please let G gain fix at default value.

6.1.4.3 Maximum Luminance Check

Since the maximum luminance should be confirmed in the condition of maximum contrast and brightness, we can define an alternative to check luminance based on experienced value.

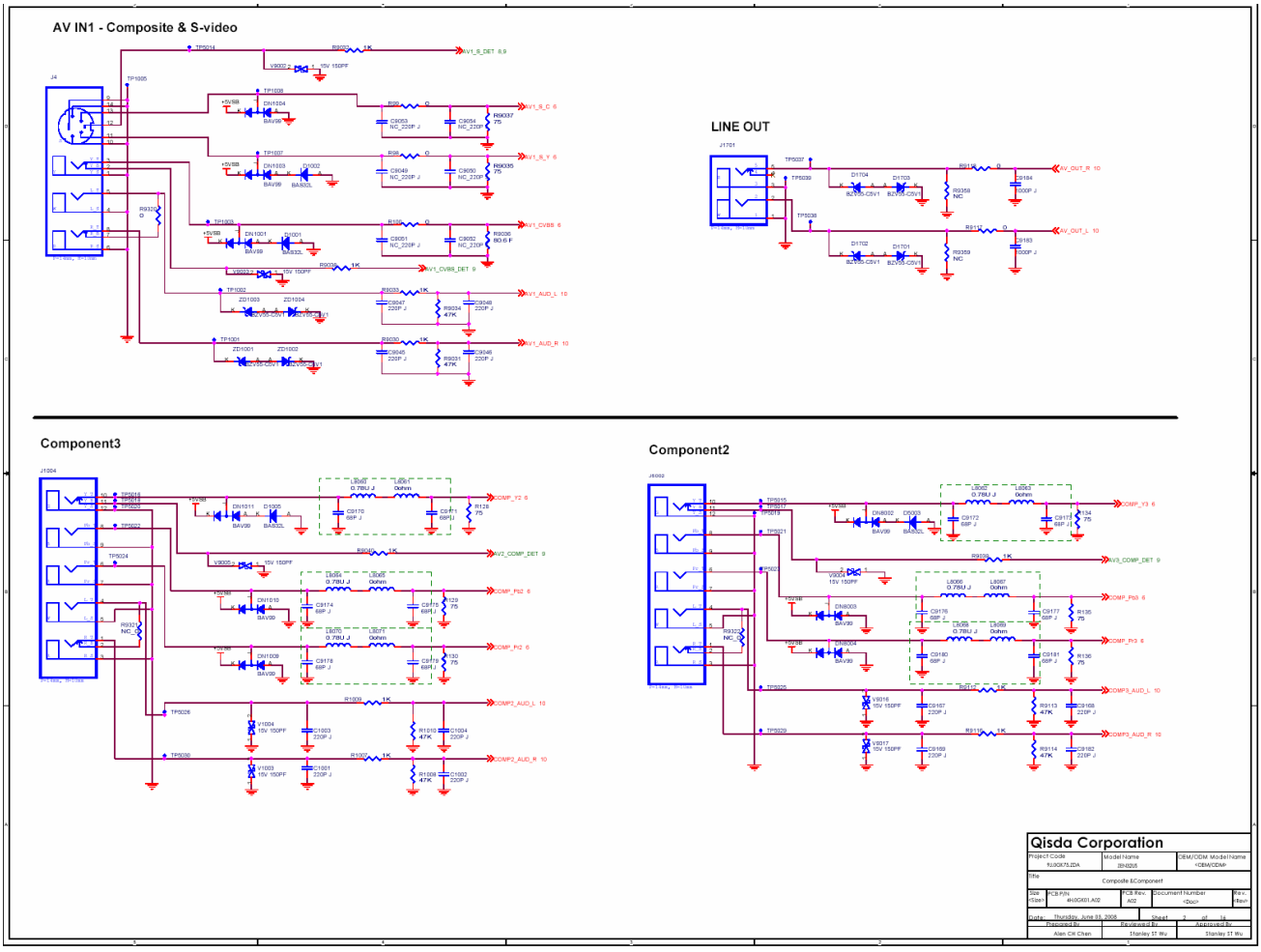
Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

7 CIRCUIT DIAGRAM

7.1 Main Board Schematics

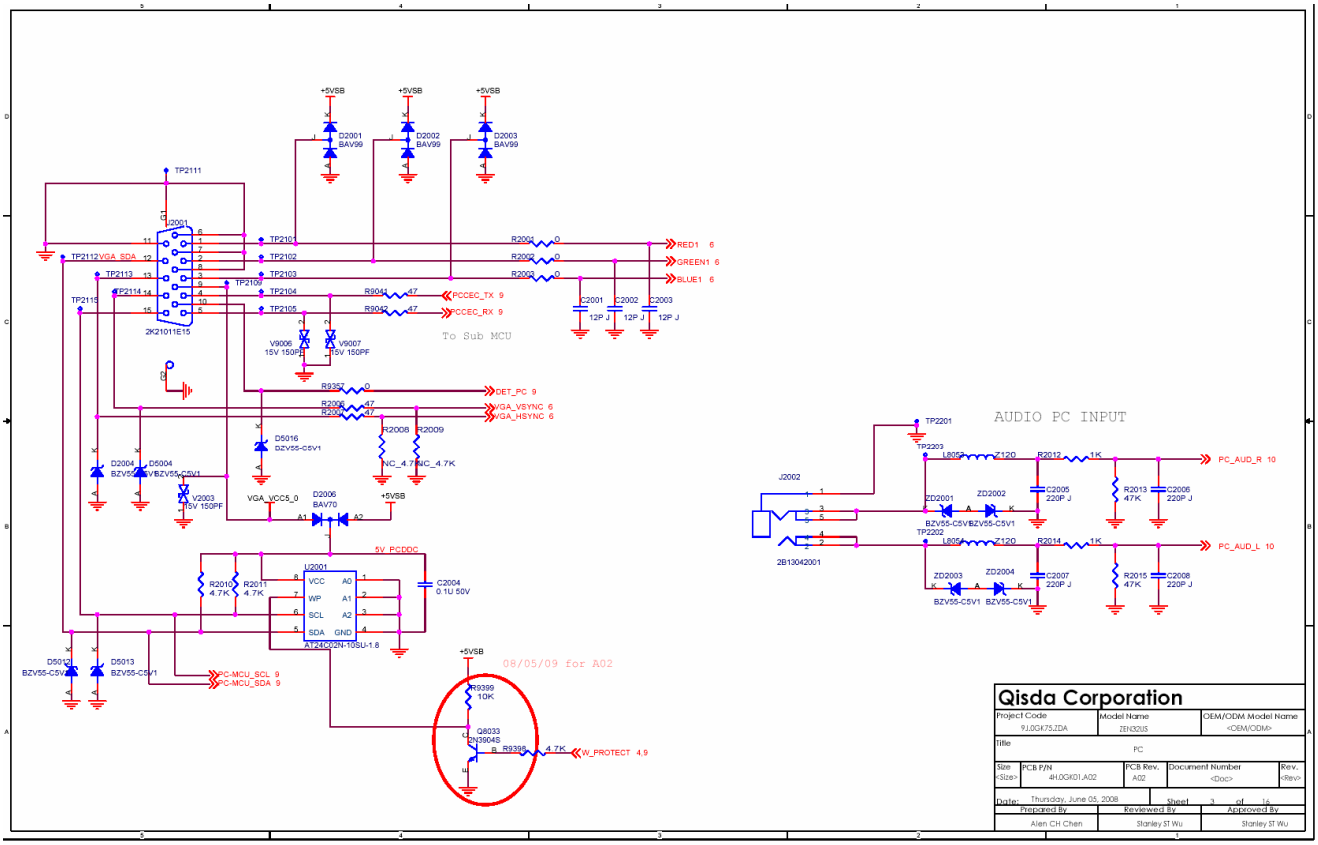
7.1.1 AV1, Component 1 and Component



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

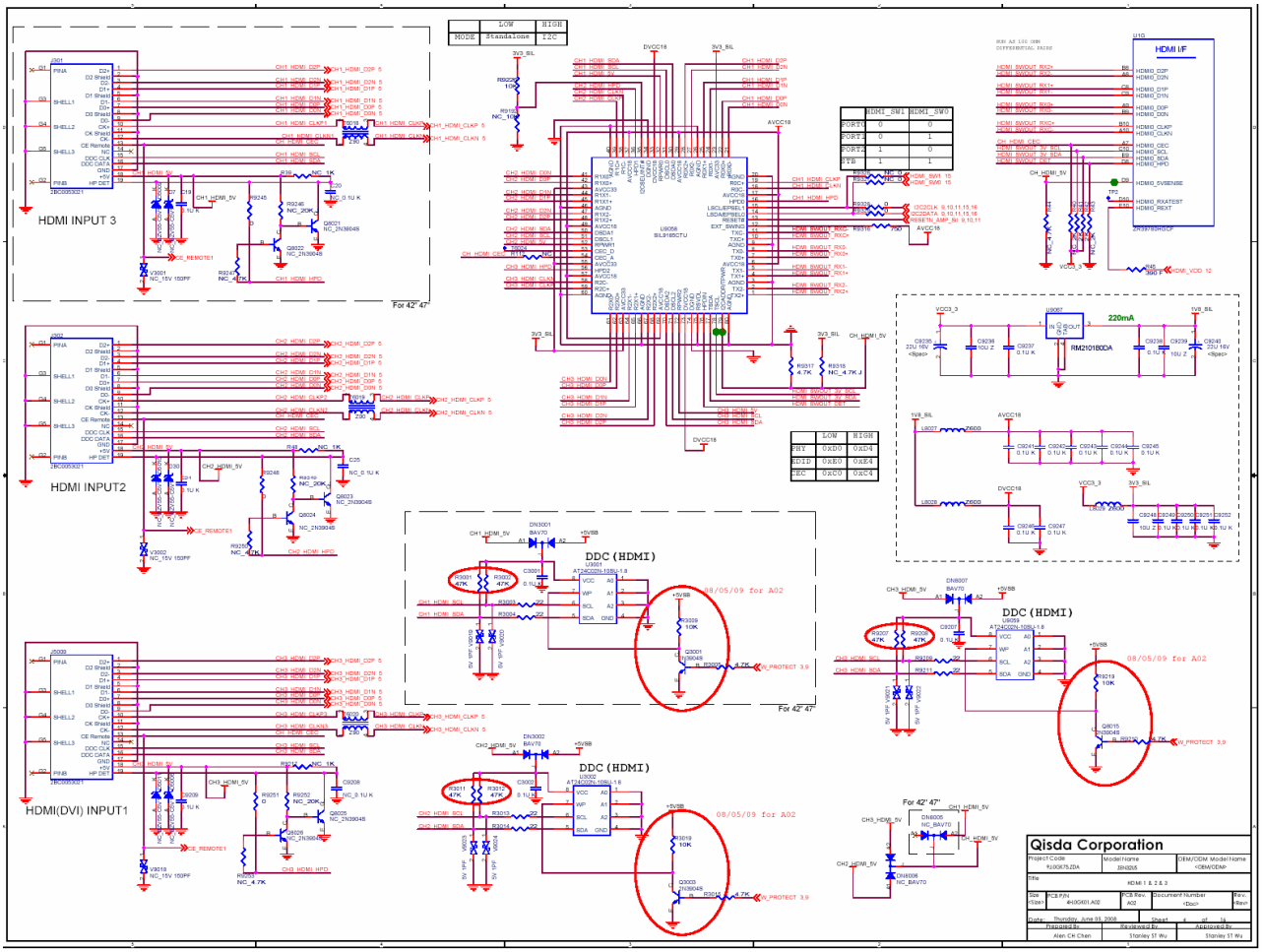
7.1.2 PC



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

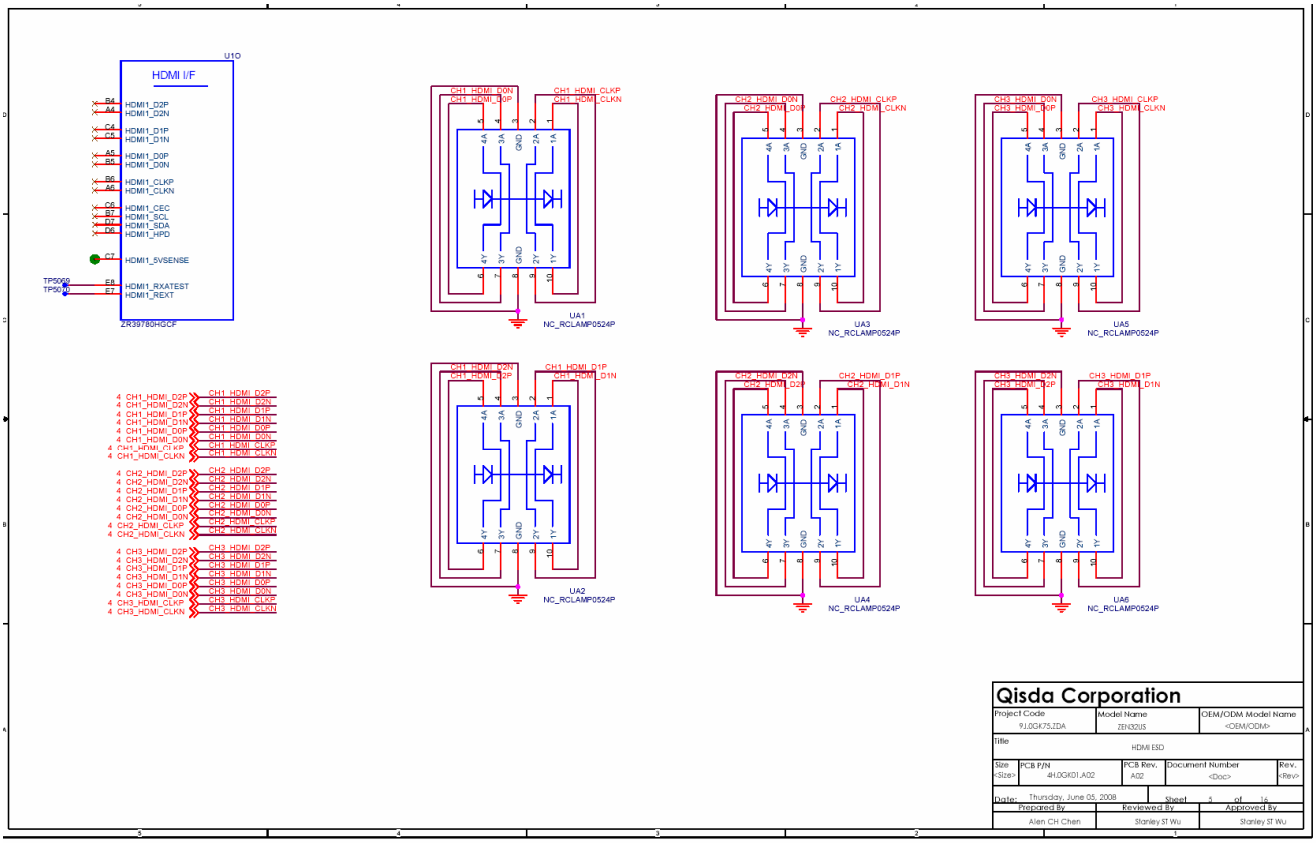
7.1.3 HDMI and HDMI switch



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

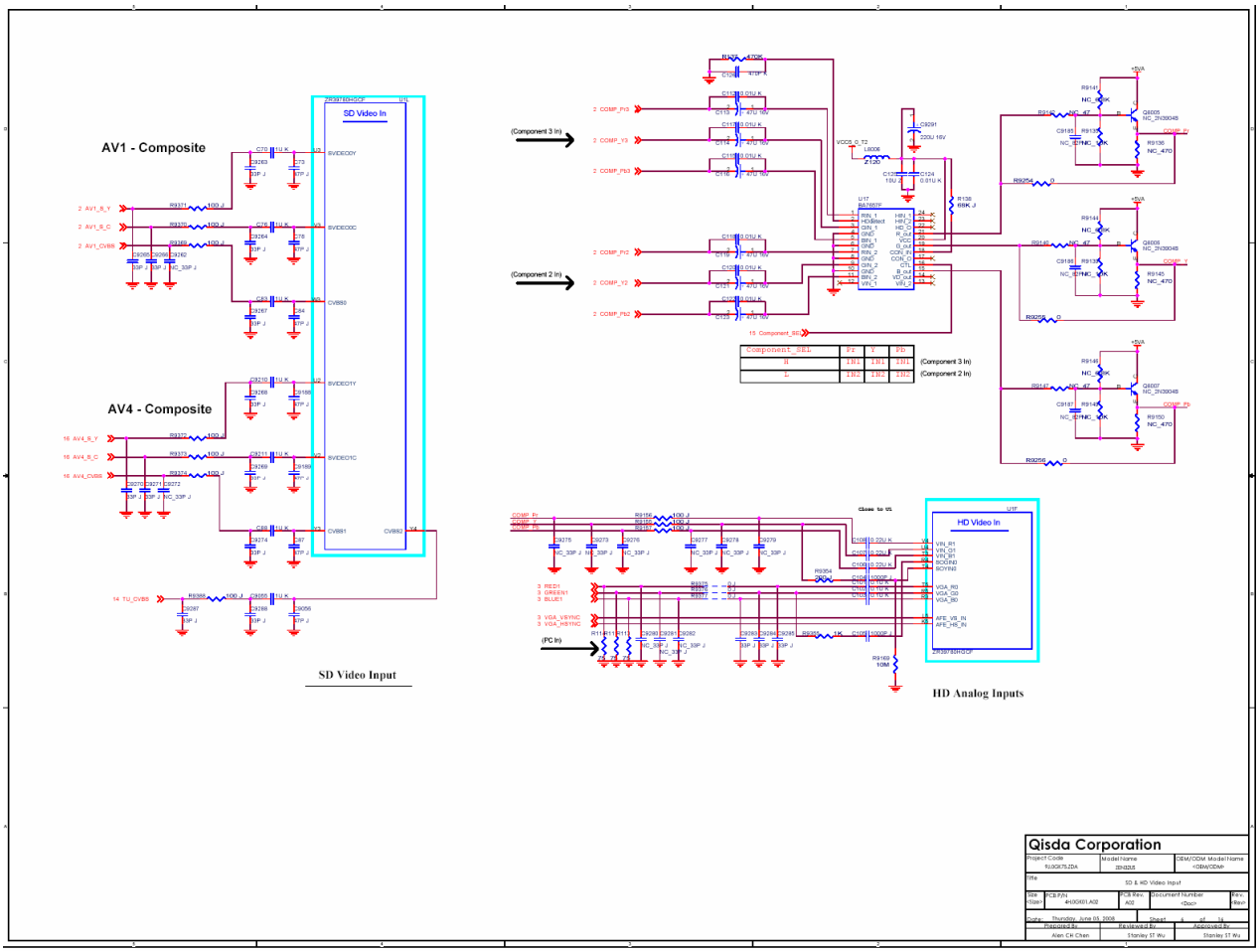
7.1.4 HDMI ESD Protection



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

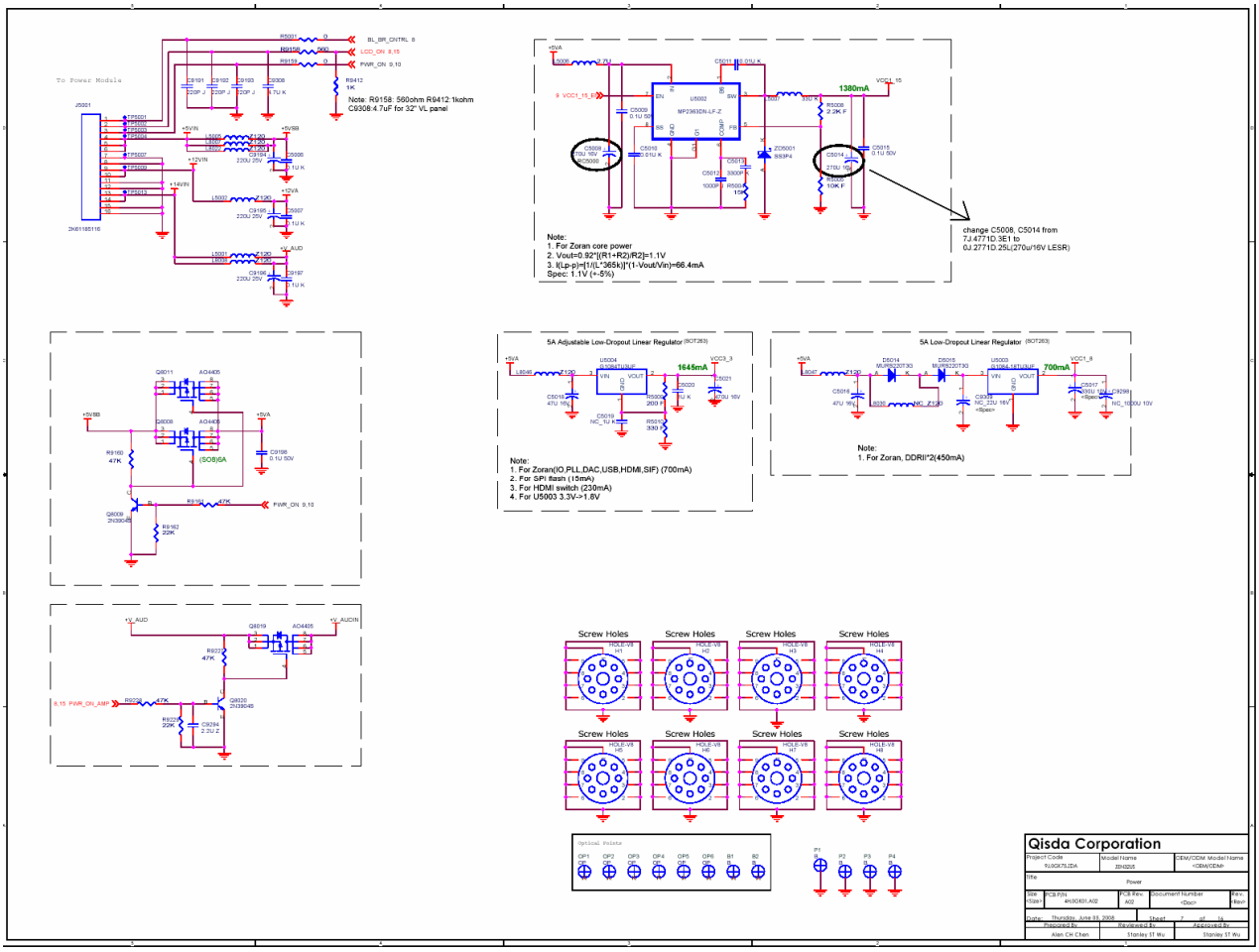
LGE Internal Use Only

7.1.5 SD and HD Video Input



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

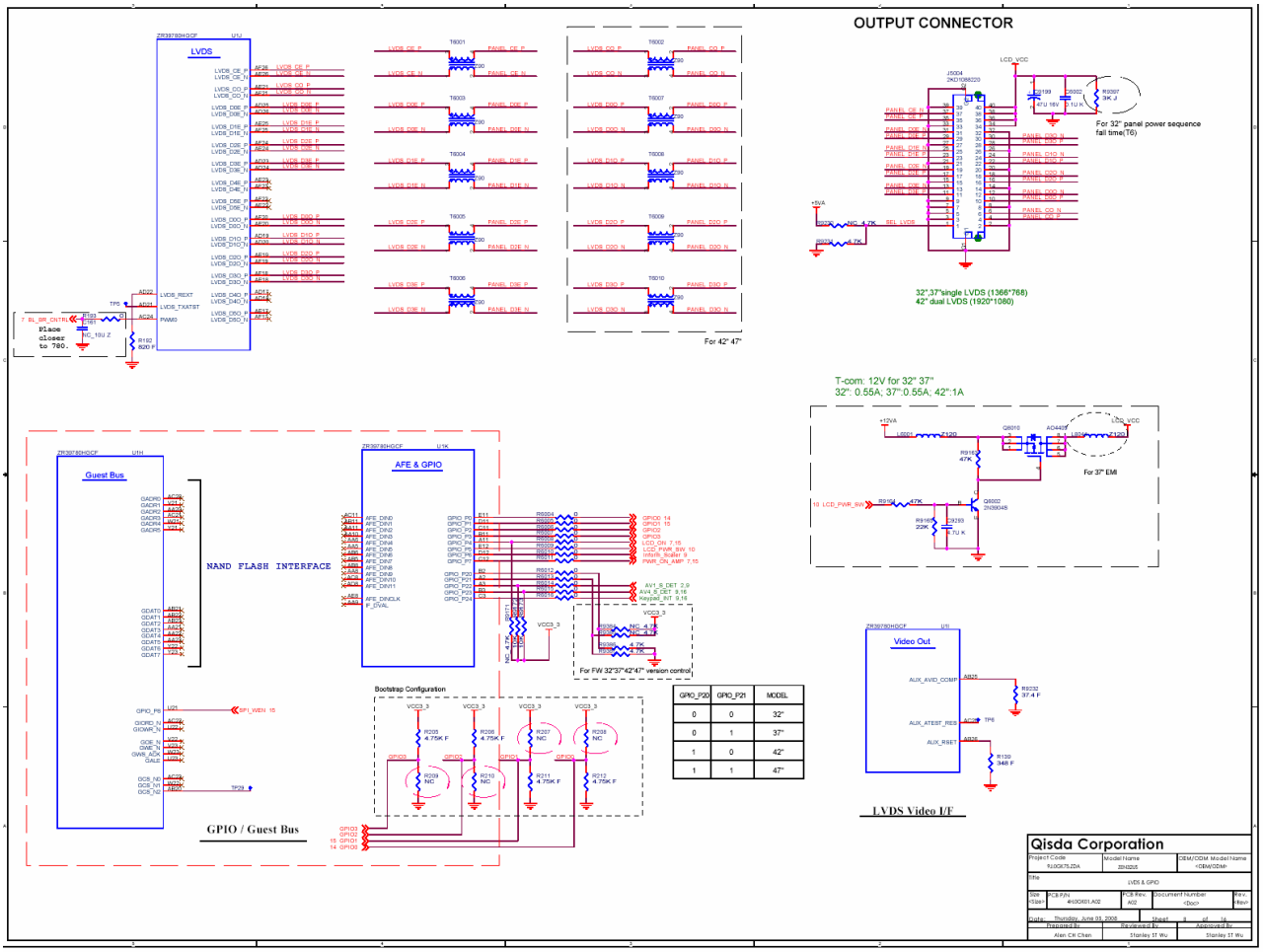
7.1.6 Power



Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

7.1.7 LVDS and GPIO

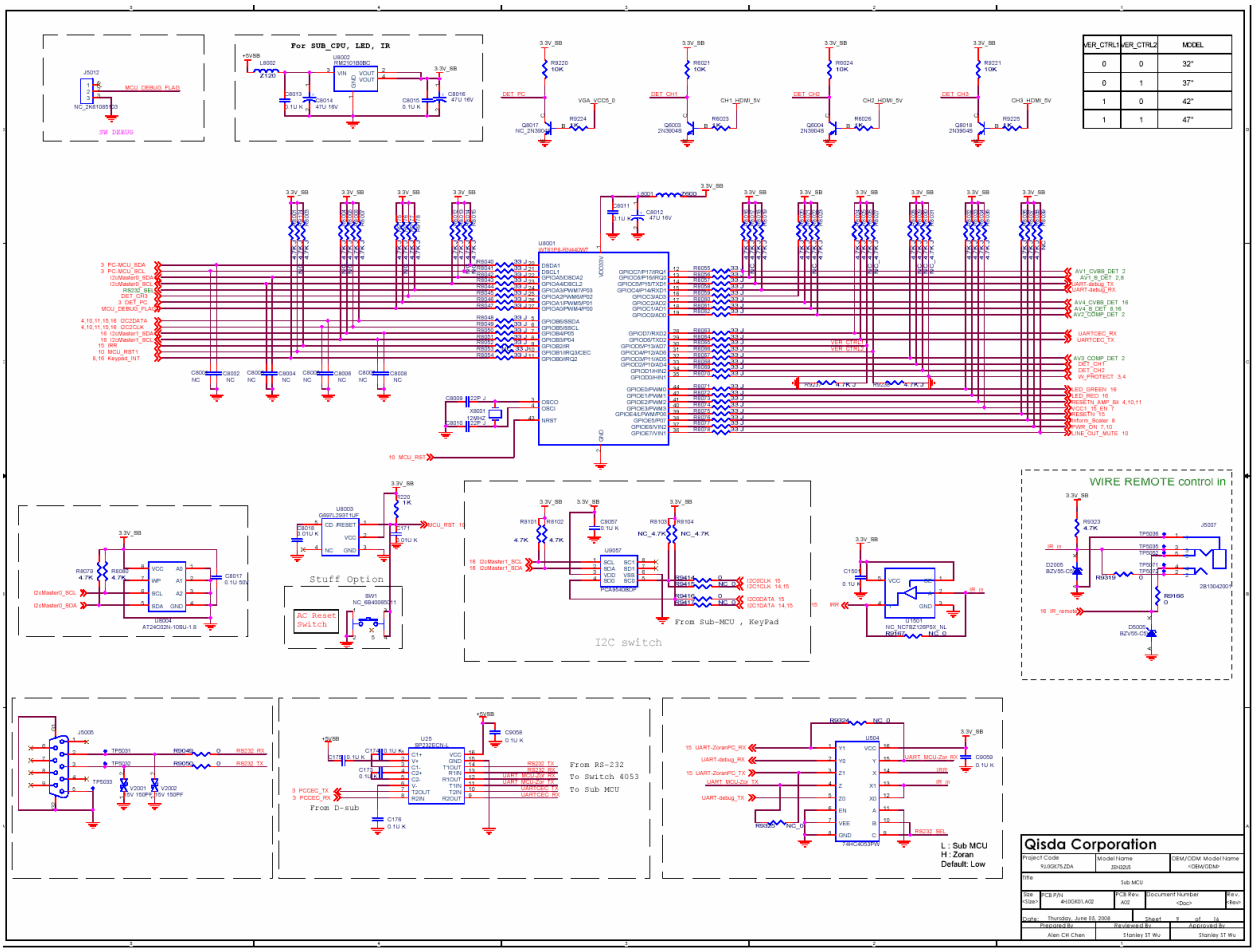


GPIO_P20	GPIO_P21	MODEL
0	0	32"
0	1	37"
1	0	42"
1	1	47"

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

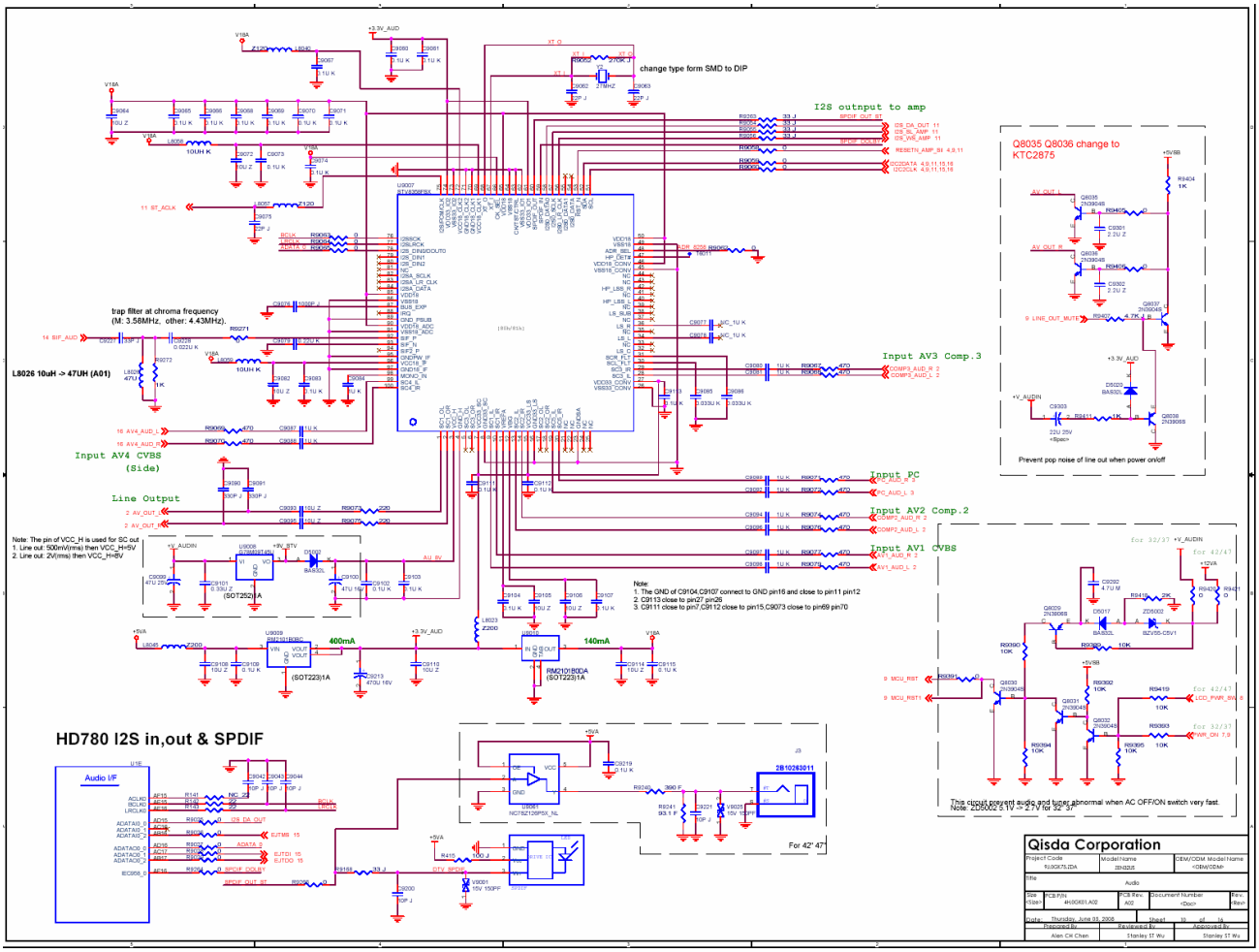
7.1.8 Sub MCU



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

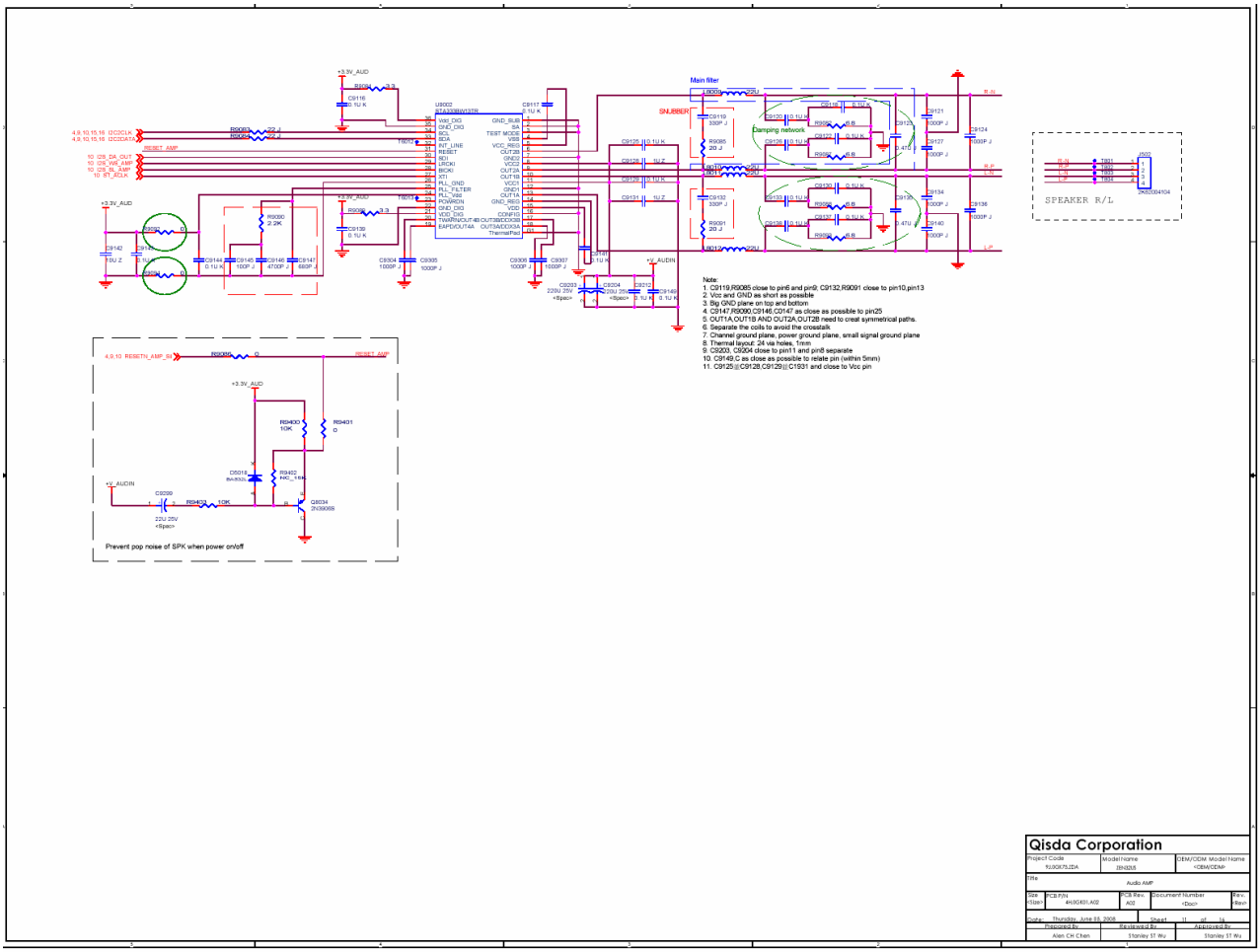
7.1.9 Audio Processor


change type form SMD to DIP
I2S outnput to amp
Q8035 Q8036 change to KTC2875
trap filter at chroma frequency (M: 3.58MHz, other: 4.43MHz).
L8026 10uH -> 47UH (A01)
Input AV3 Comp.3
Input AV4 CVBS (Side)
Line Output
Input PC
Input AV2 Comp.2
Input AV1 CVBS
Prevent pop noise of line out when power on/off
Note: The pin of VCC_H is used for SC out
1. Line out: 500mV(rms) then VCC_H=5V
2. Line out: 2V(rms) then VCC_H=8V
Note:
1. The GND of C9104,C9107 connect to GND pin16 and close to pin11 pin12
2. C9113 close to pin27 pin28
3. C9111 close to pin7,C9112 close to pin15,C9073 close to pin69 pin70
400mA
140mA
HD780 I2S in,out & SPDIF
Audio I/F
This circuit prevent audio and tuner abnormal when AC OFF/ON switch very fast.
Note: 2.05002.5V -> 2.7V for 32~37
Qisda Corporation

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

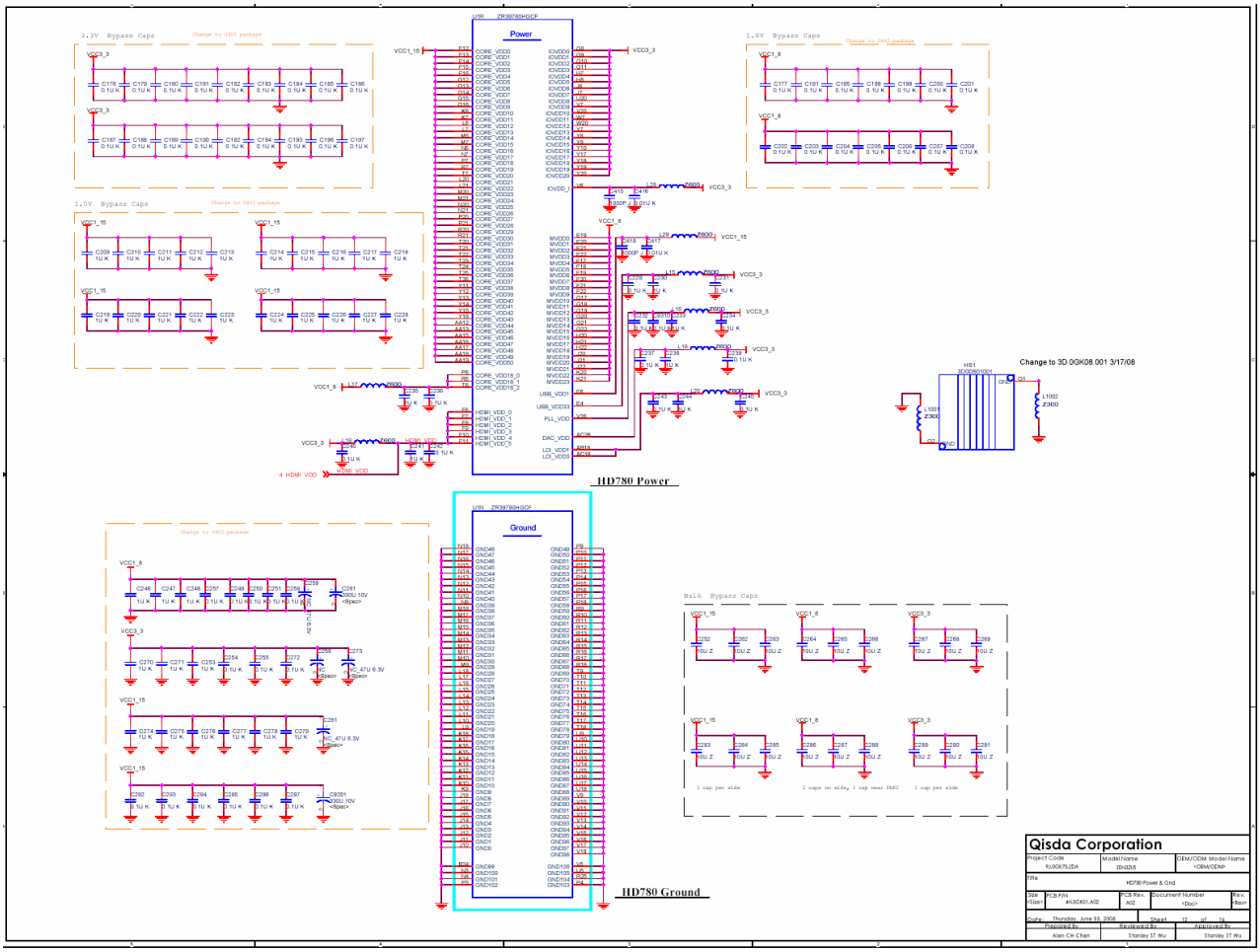
7.1.10 Audio Amplifier


Main filter
SNUBBER
Damping network
SPEAKER R/L
Note:
1. C9119,R9085 close to pin6 and pin9; C9132,R9091 close to pin10,pin13
2. Vcc and GND as short as possible
3. Big GND plane on top and bottom
4. C9147,R9090,C9146,C0147 as close as possible to pin25
5. OUT1A,OUT1B AND OUT2A,OUT2B need to creat symmetrical paths.
6. Separate the coils to avoid the crosstalk
7. Channel ground plane, power ground plane, small signal ground plane
8. Thermal layout: 24 via holes, 1mm
9. C8203, C8204 close to pin11 and pin8 separate
10. C9148 C as close as possible to relate pin (within 5mm)
11. C9125||C9128,C9129||C1931 and close to Vcc pin
Prevent pop noise of SPK when power on/off
Qisda Corporation

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

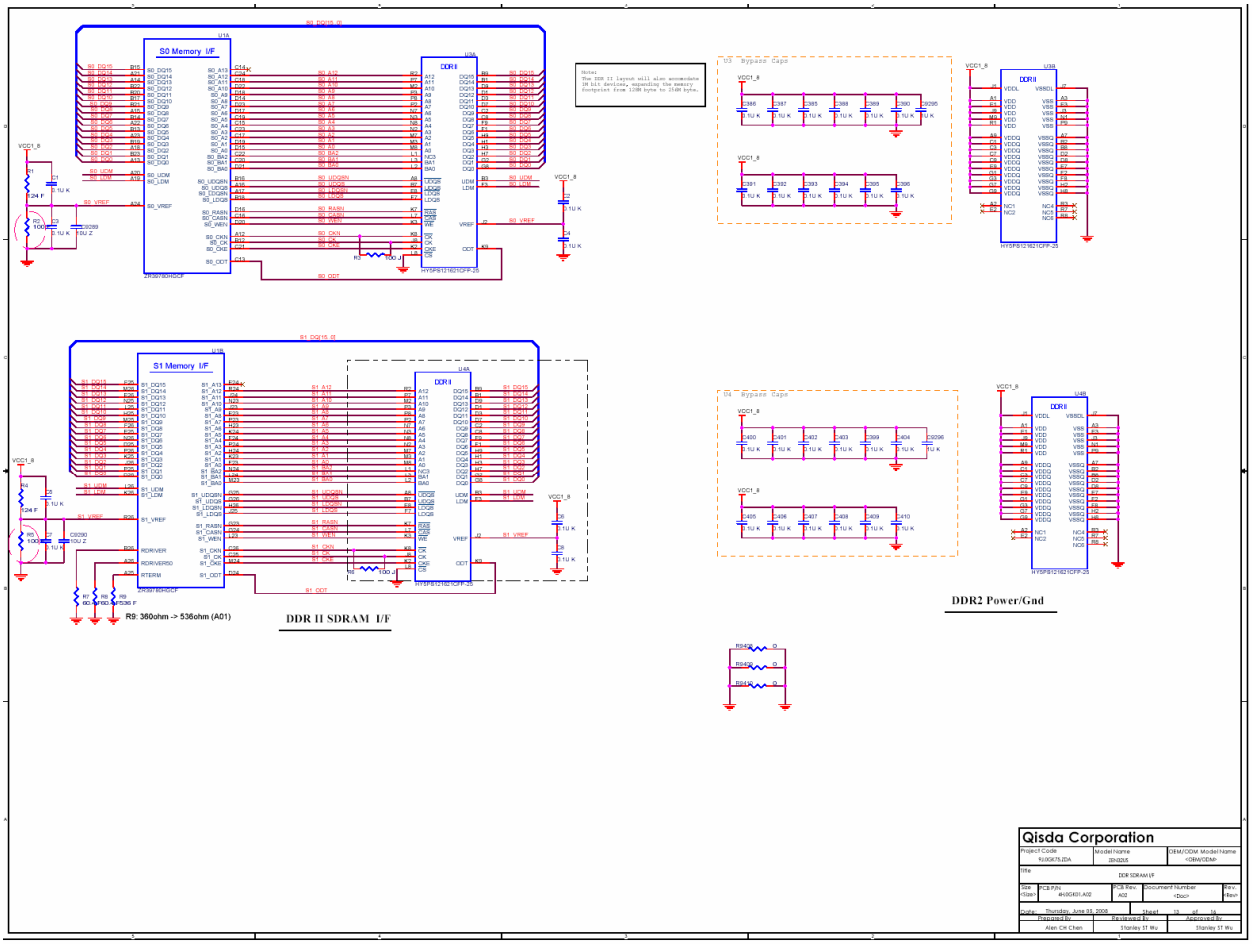
7.1.11 HD780 Power and Ground



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

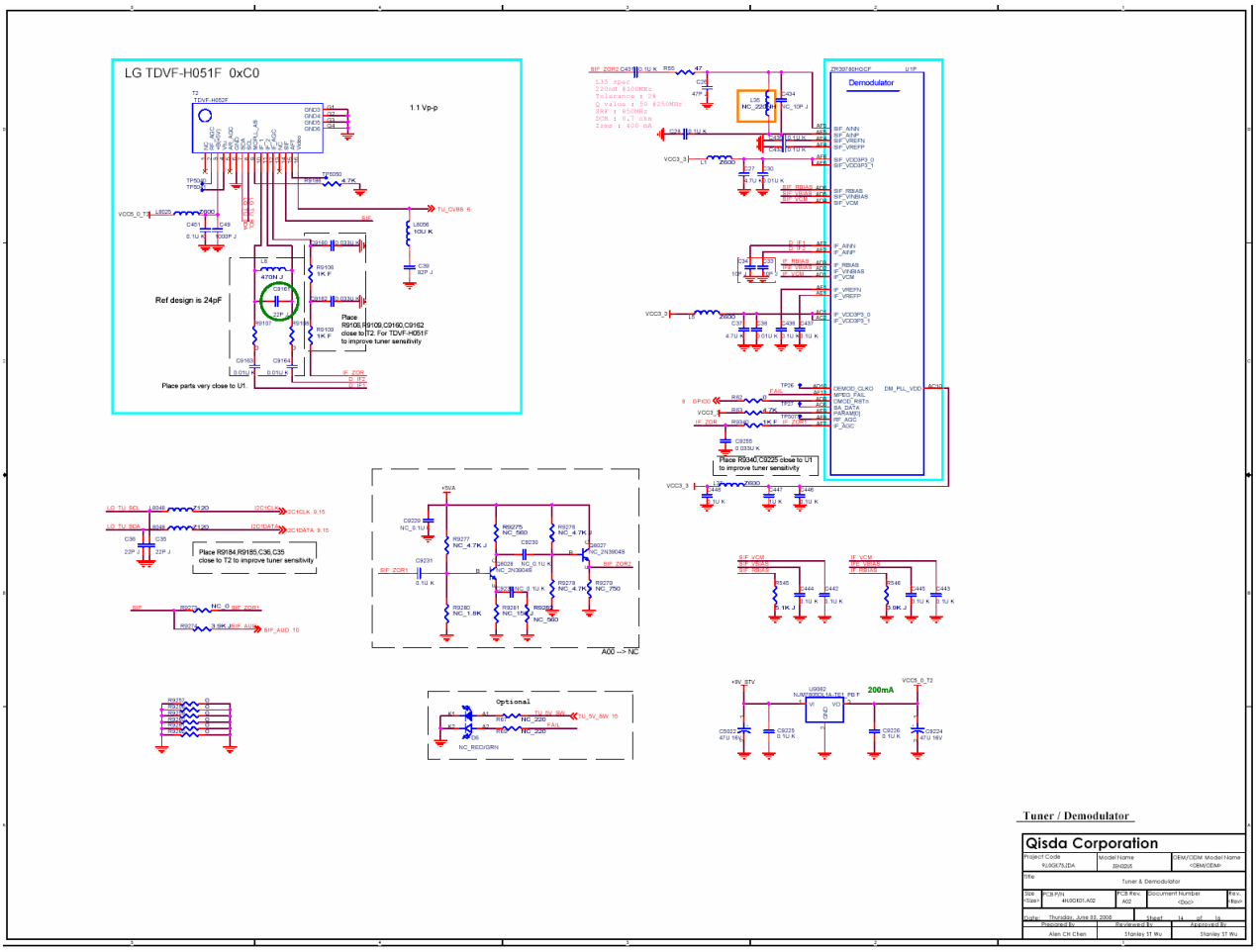
7.1.12 DDR Interface



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

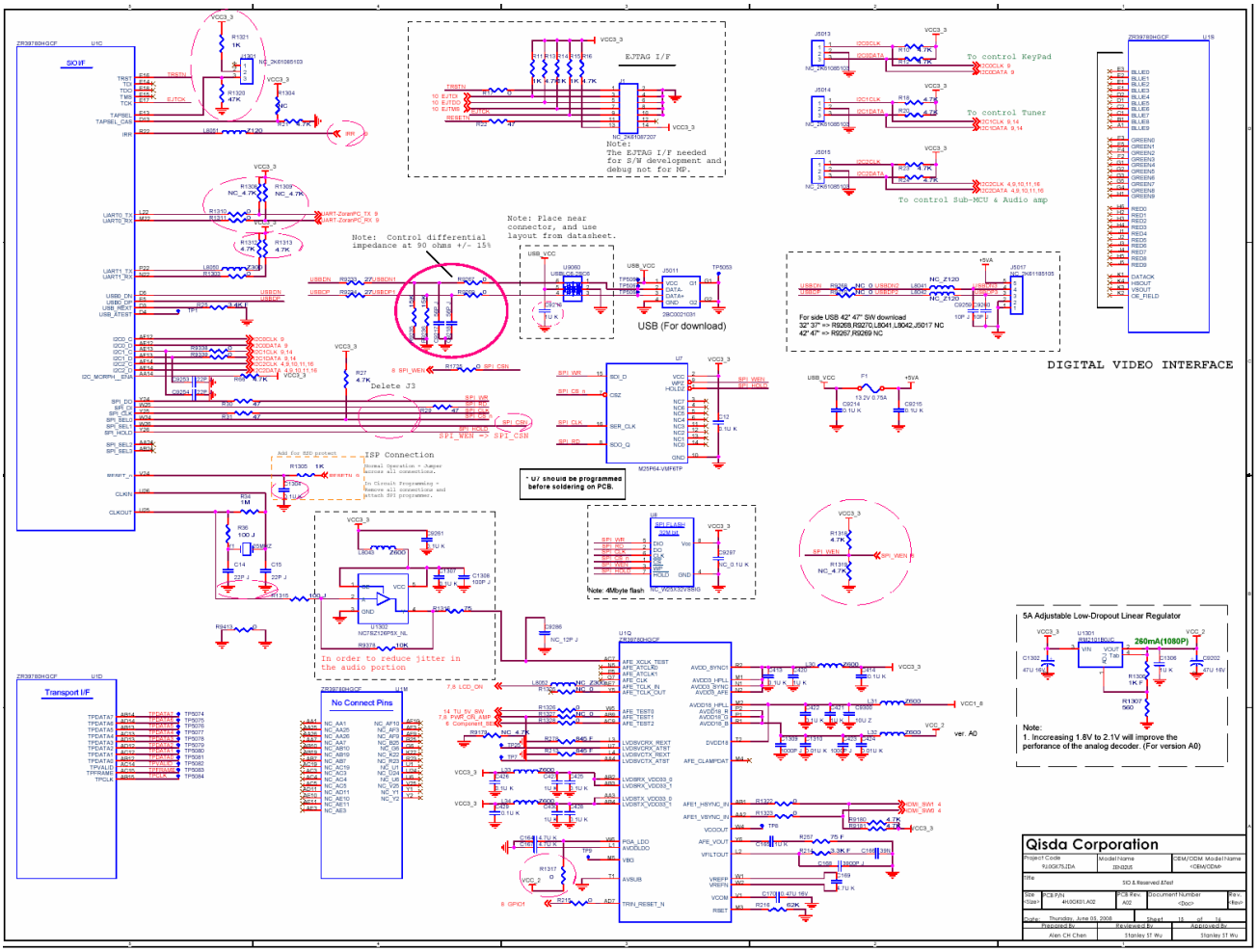
LGE Internal Use Only

7.1.13 Tuner and Demodulator



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

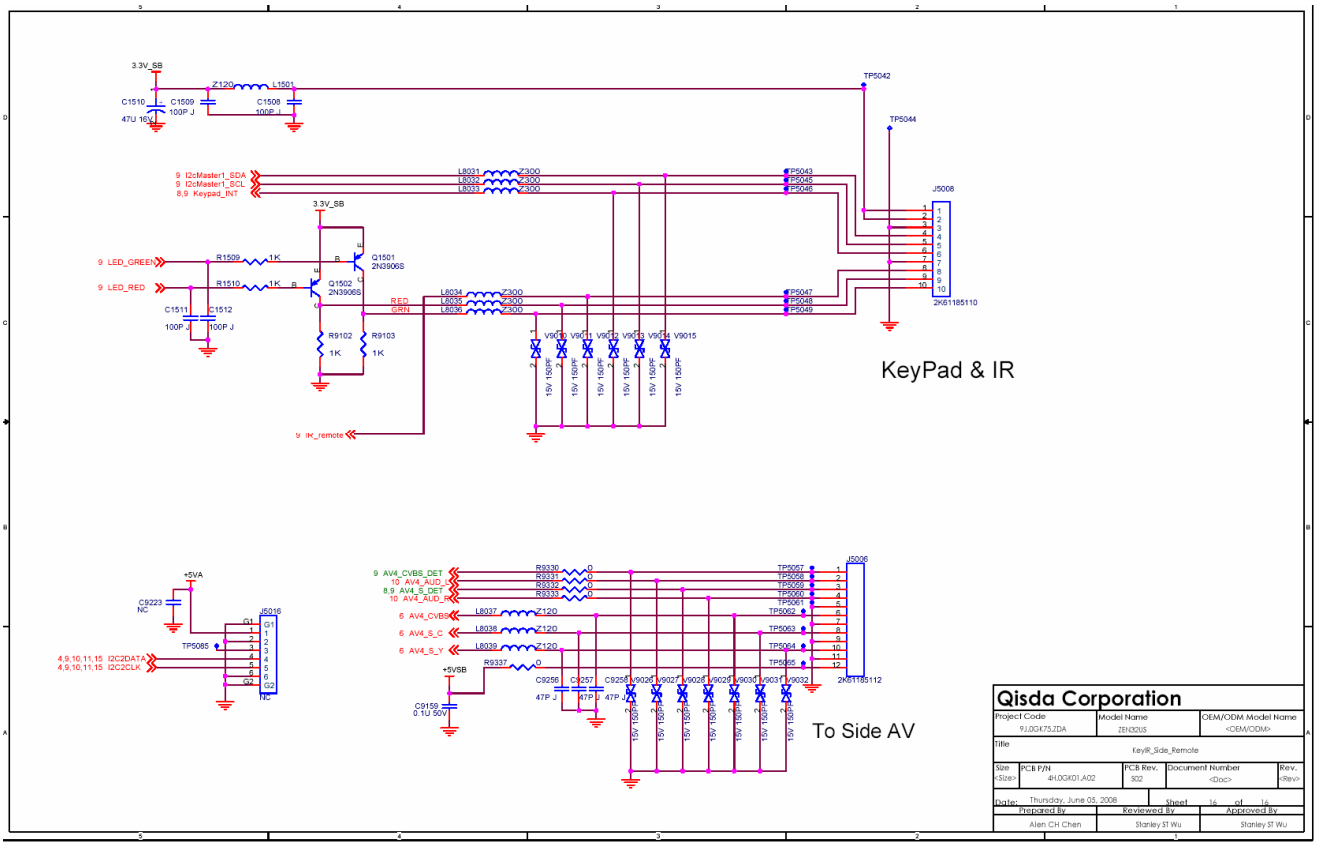
7.1.14 IO & Reserved & Test



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

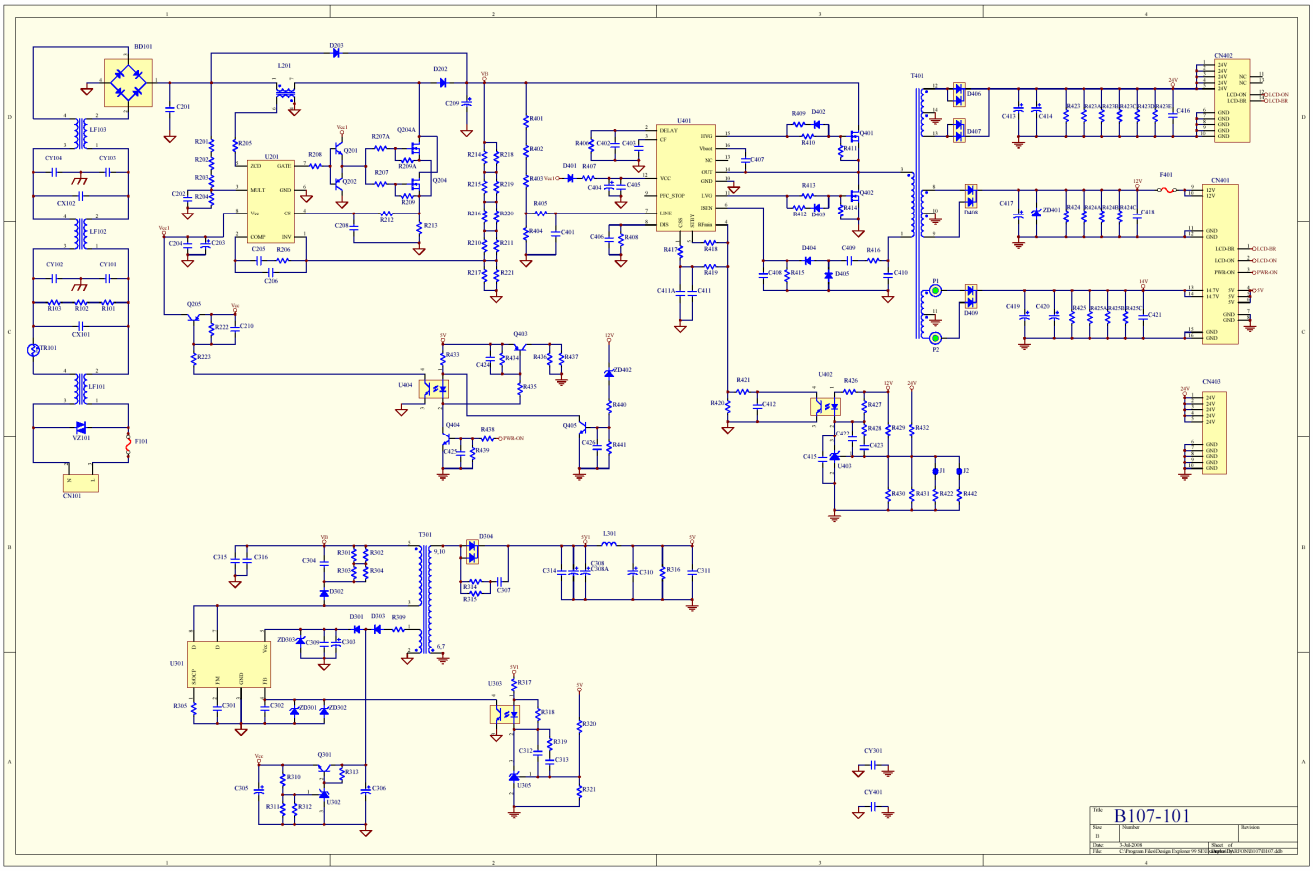
7.1.15 Key & IR & Remote & Side



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

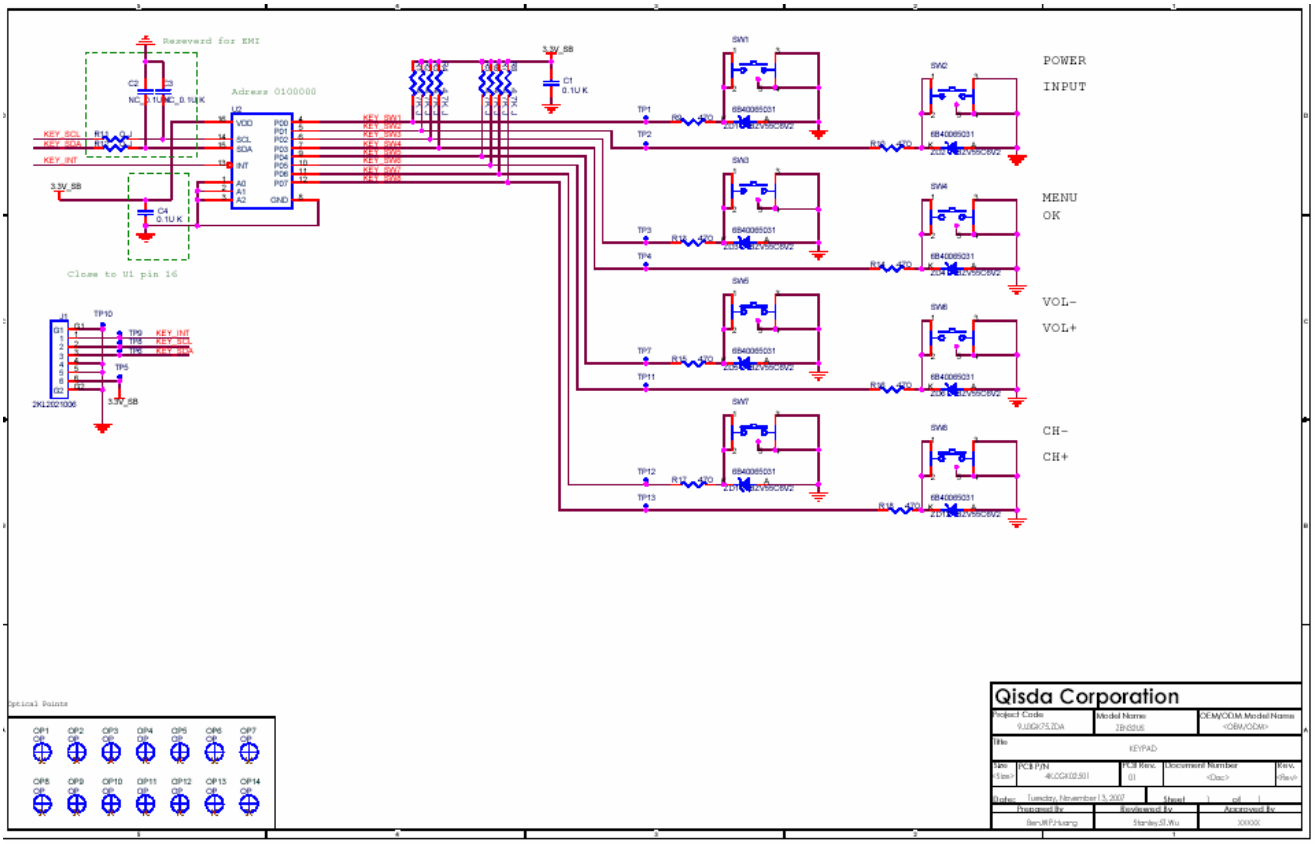
7.2 Power Board Schematics



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

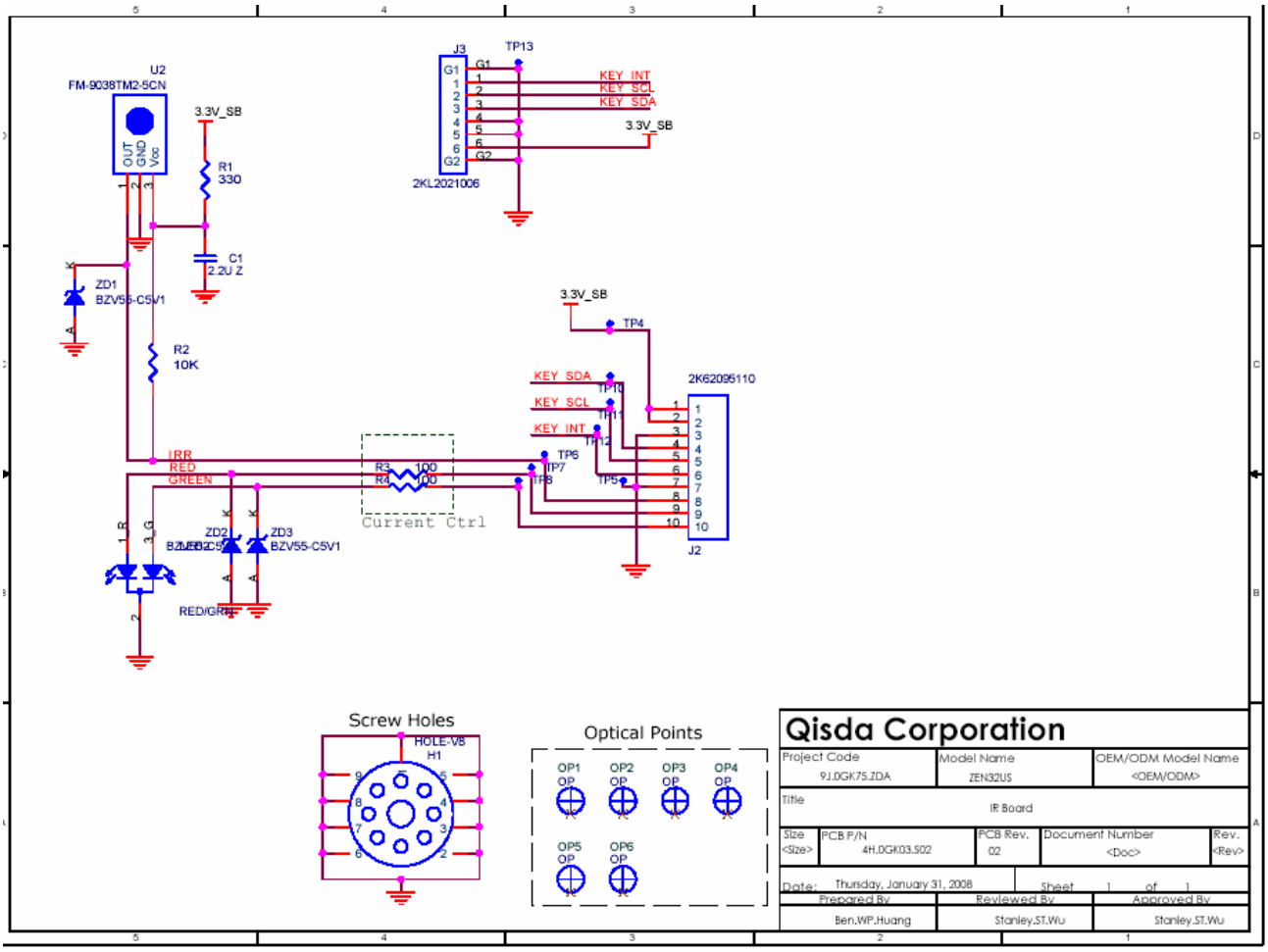
7.3 Keypad BD Schematics



Copyright © 2008 LG Electronics. Inc. All right reserved.

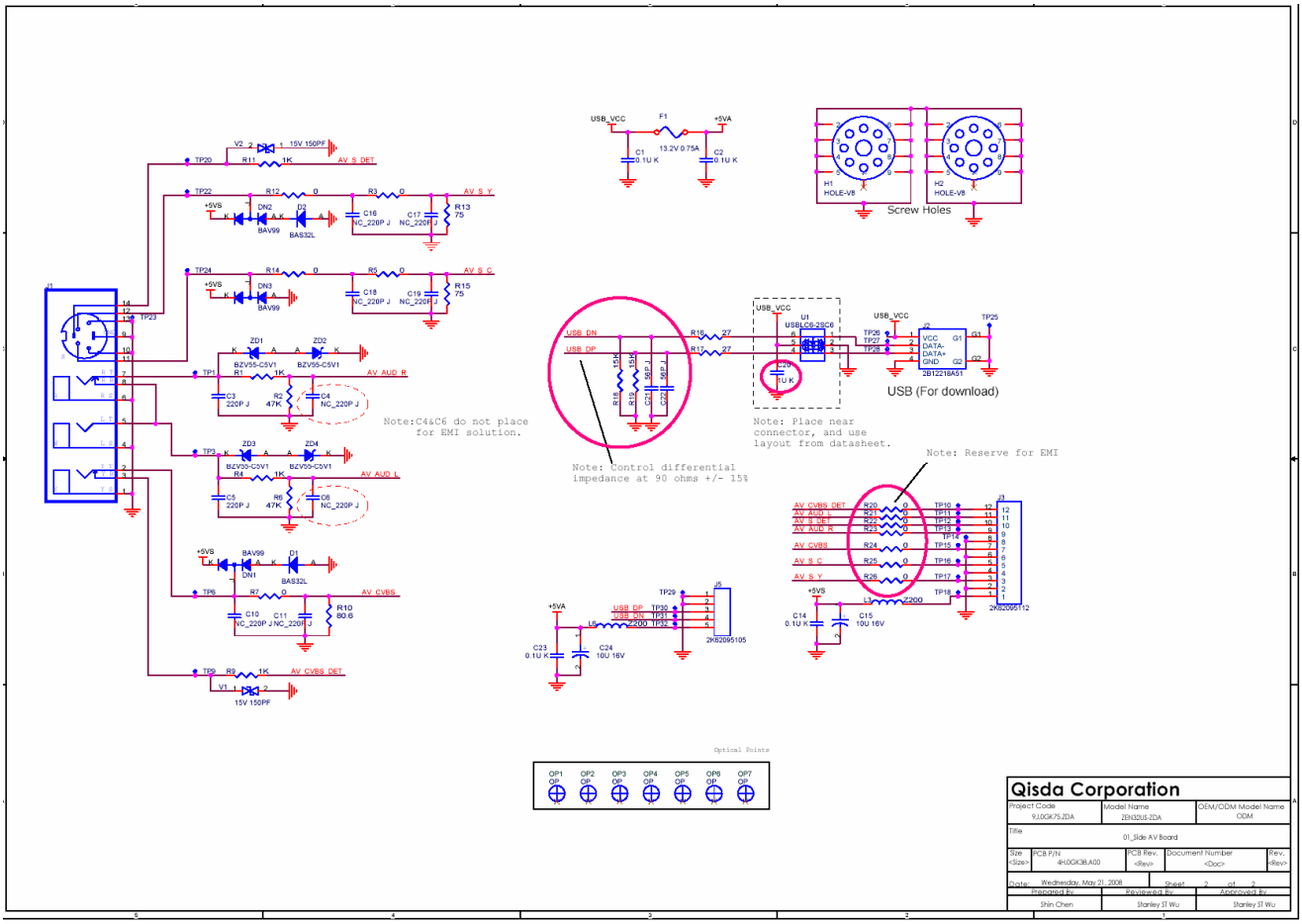
LGE Internal Use Only
Only for training and service purposes

7.4 IR BD Schematics



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

7.5 Side AV BD Schematics


Screw Holes
USB (For download)
Note:C4&C6 do not place for EMI solution.
Note: Control differential impedance at 90 ohms +/- 15%
Note: Place near connector, and use layout from datasheet.
Note: Reserve for EMI
Qisda Corporation
01_Side AV Board

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only

8 EDID WRITE

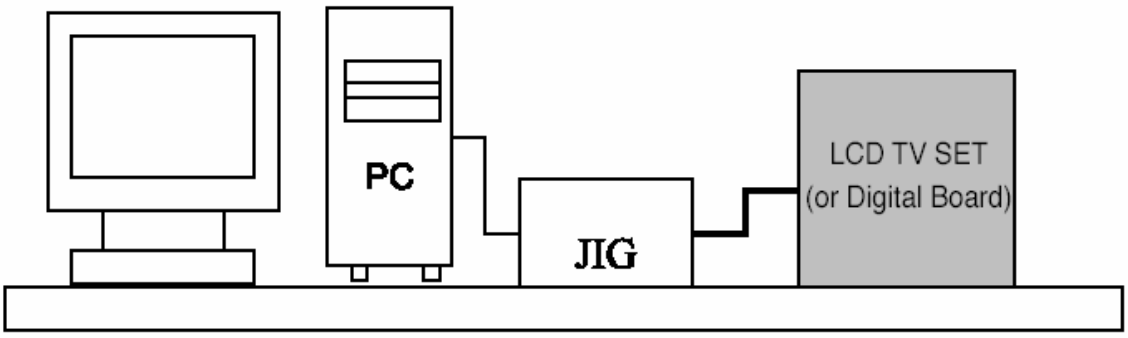
8.1 Summary

It is established in VESA, for communication between PC and Monitor without order from user for building user condition. It helps to make easily use realize "Plug and Play" function.

8.2 Write HDMI EDID data

(1) Using instruments
1) Jig. (PC Serial to D-Sub connection) for PC, DDC adjustment.
2) S/W for DDC recording (EDID data write and read)
3) D-sub jack
4) Additional HDMI cable connection Jig.

(2) Preparing and setting.
1) Set instruments and Jig. Like fig.4), then turn on PC and Jig.
2) Operate DDC write S/W (EDID write & read)
3) It will operate in the DOS mode.



<Fig. 3> Device configuration diagram for HDMI EDID Data input

Copyright © 2008 LG Electronics. Inc. All right reserved.

Only for training and service purposes

8.3 EDID DATA

37” PC

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	00	11	01	03	68	73	41	96	0A	CF	30	A3	57	4C	B0	23
20	09	50	4E	A1	08	00	01	01	01	01	01	01	01	01	01	01
30	01	01	01	01	01	01	1B	21	50	A0	51	00	1E	30	48	88
40	35	00	C4	8E	21	00	00	1E	0E	1F	00	80	51	00	1E	30
50	40	80	37	00	C4	8E	21	00	00	1C	00	00	00	FD	00	38
60	4B	1F	3C	09	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	5A	45	4E	49	54	48	0A	20	20	20	20	20	20	00	B4

37” HDMI1

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	00	11	01	03	80	73	41	96	0A	CF	74	A3	57	4C	B0	23
20	09	48	4C	2F	CE	00	31	40	45	40	61	40	01	01	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	C4	8E	21	00	00	1E	0E	1F	00	80	51	00	1E	30
50	40	80	37	00	C4	8E	21	00	00	1E	00	00	00	FD	00	38
60	4B	1F	3C	09	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	5A	45	4E	49	54	48	0A	20	20	20	20	20	20	01	41

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	17	F1	47	84	05	03	02	20	22	10	23	11	07	50
10	66	03	0C	00	10	00	80	01	1D	00	72	51	D0	1E	20	6E
20	28	55	00	C4	8E	21	00	00	1E	01	1D	80	18	71	1C	16
30	20	58	2C	25	00	C4	8E	21	00	00	9E	8C	0A	D0	8A	20
40	E0	2D	10	10	3E	96	00	C4	8E	21	00	00	18	8C	0A	D0
50	8A	20	E0	2D	10	10	3E	96	00	13	8E	21	00	00	18	00
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	17

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

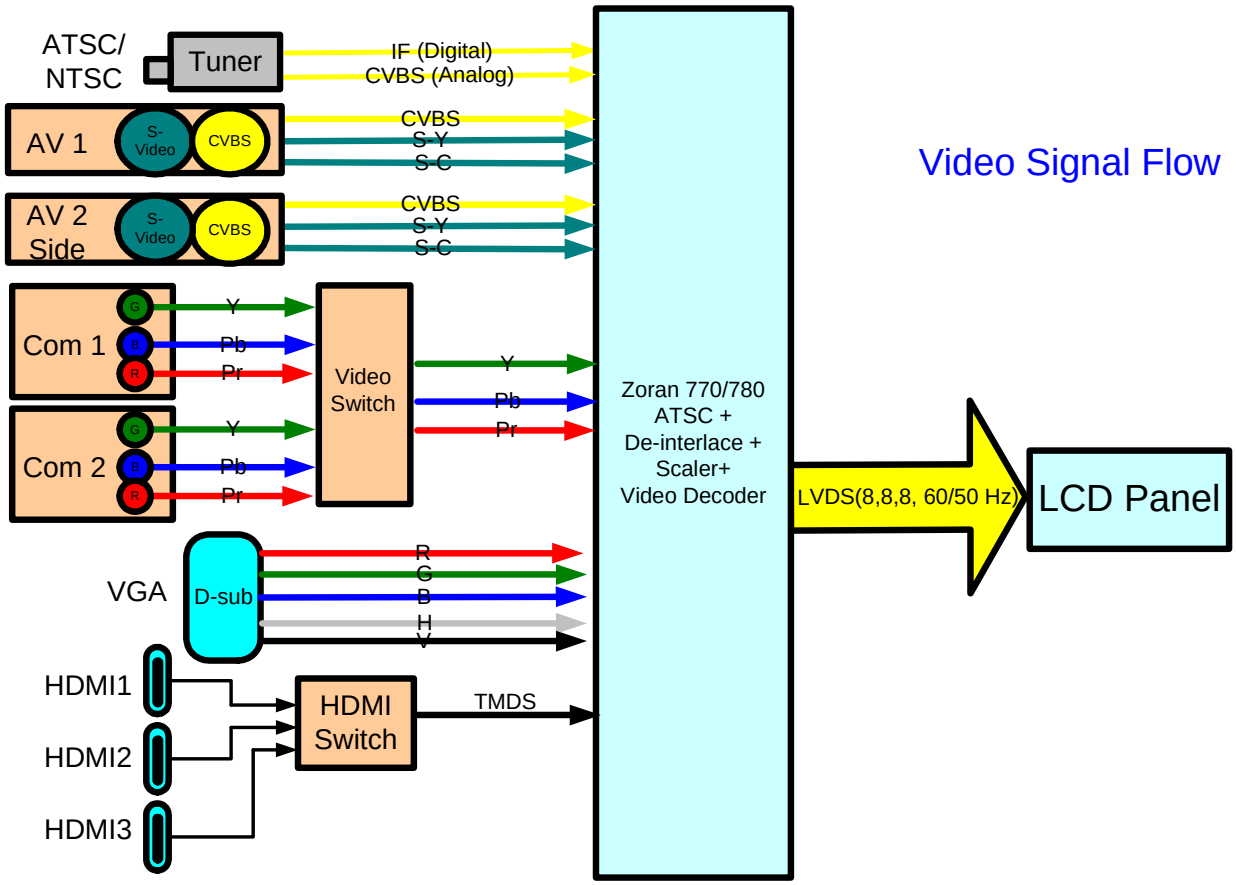
37” HDMI2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	00	11	01	03	80	73	41	96	0A	CF	74	A3	57	4C	B0	23
20	09	48	4C	2F	CE	00	31	40	45	40	61	40	01	01	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	C4	8E	21	00	00	1E	0E	1F	00	80	51	00	1E	30
50	40	80	37	00	C4	8E	21	00	00	1E	00	00	00	FD	00	38
60	4B	1F	3C	09	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	5A	45	4E	49	54	48	0A	20	20	20	20	20	20	01	41

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	17	F1	47	84	05	03	02	20	22	10	23	11	07	50
10	66	03	0C	00	20	00	80	01	1D	00	72	51	D0	1E	20	6E
20	28	55	00	C4	8E	21	00	00	1E	01	1D	80	18	71	1C	16
30	20	58	2C	25	00	C4	8E	21	00	00	9E	8C	0A	D0	8A	20
40	E0	2D	10	10	3E	96	00	C4	8E	21	00	00	18	8C	0A	D0
50	8A	20	E0	2D	10	10	3E	96	00	13	8E	21	00	00	18	00
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	07

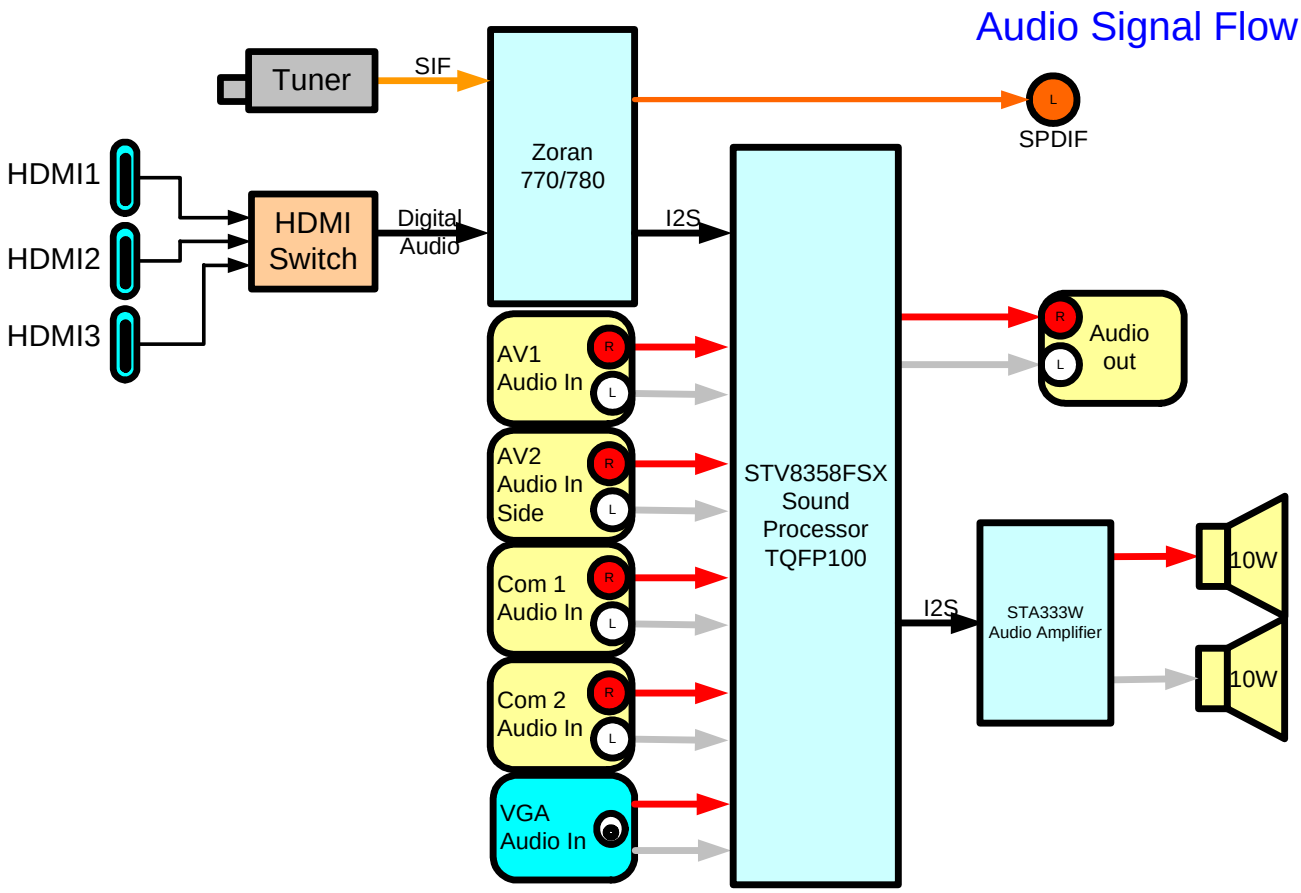
Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

9 SYSTEM BLOCK DIAGRAM



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

LGE Internal Use Only



Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

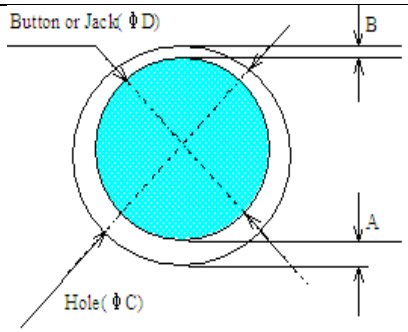
LGE Internal Use Only

10 APPEARANCE INSPECTION

1.2 - External checks	
Checking Item	**Test SPEC.**
Surface High Glossy	follow the sample given by LG
Surface Hardness	* Test : ① Make the 5 lines using HB pencil(under 1kgf) ② Erase it using the ultra fine cloth * Judgment : Must be no scratch on testing surface.
Cosmetics of Front Bezel & Stand	① Must be no Black dots, air bubbles, scratches, internal/external dust, mote, and Paint lumps that occur upon injection, post-manufacturing and handling. ② Must be no weld lines, flow marks, gates on appearance surface.
Cosmetics of Back Cover	① Must be no flash, weld lines, flow marks, shiny spots. ② The gates should look gook. Make it sink on surface. ③ Surface texture pattern must be same with the sample given by LG.
Other cosmetics	follow LG ID spec.
Gaps between LCD panel & Bezel	① Keep the gap below 1.0mm all sides. Δgap must be blow 0.5mm. ② Must not see internal sheet metal.
Gaps between Bezel and Back cover	Keep the gap below 0.8mm all sides. Δgap must be blow 0.3mm.
Gaps between stationary plastic parts	Gaps between stationary parts should be consistent and match ID spec.

Copyright © 2008 LG Electronics. Inc. All right reserved.

LGE Internal Use Only
Only for training and service purposes

Eccentricity of button, jack, and indicator	 * B/A x 100% ≥ 60%
Air vent holes	follow UL & IEC standards.
AV jacks	When all AV jack is connected, they must be no interrupt

1.2 - External checks

Checking Item	Test SPEC.
Control Buttons	① The button mechanism must be smooth to operate and robust. ② Buttons should not rattle, be too loose, or too tight
Printing	follow LG ID spec. included color, size, font…
Printing Ink Test	* Test : Scrub 50 times both ways using JIG. The Jig is 1kgf weight, wrapped the gauze stained ethyl alcohol. Scraping speed is 30~40times/min. * Judgments : Must not be erased.
Kensington Lock	Add Kensington Lock hole on lower left corner.
Cable management	Cable management should not be too loose, or too tight.

Copyright © 2008 LG Electronics. Inc. All right reserved.
Only for training and service purposes

P/NO : MFL39166213

Jul., 2008
Printed in Korea